DOCUMENT RESUME

ED 376 270 CE 067 142

| | |
|---|---|
| AUTHOR | Dordan, Mary Lou; Nicholson, Deborah |
| TITLE | Women and Minorities in Alaskan Aviation. Alaskan Equity Publication. |
| INSTITUTION | Alaska State Dept. of Education, Juneau. |
| PUB DATE | 94 |
| NOTE | 131p. |
| AVAILABLE FROM | Gender Equity Specialist, Department of Education, 801 West 10th Street, Suite 200, Juneau, AK 99801-1894 ($4 in-state, $6 out-of-state, plus 10% shipping and handling). |
| PUB TYPE | Guides - Classroom Use - Teaching Guides (For Teacher) (052) -- Tests/Evaluation Instruments (160) |
| EDRS PRICE | MF01/PC06 Plus Postage. |
| DESCRIPTORS | *Aircraft Pilots; Alaska Natives; *Aviation Education; Career Awareness; Classroom Techniques; Educational Resources; *Females; History; Learning Activities; *Minority Groups; Secondary Education; Sex Fairness; *Teaching Methods |
| IDENTIFIERS | *Alaska |

ABSTRACT

This resource guide tells the story of Alaskan women and minority aviators and those in aviation-related businesses, from the early 20th century to the present. Developed for secondary students but also suitable for younger students, the guide combines six accounts of Alaskan women and minority aviators with classroom activities centered around the materials. Classroom materials include learning activities such as research questions, puzzles, and art projects. The first three sections of the guide cover early aviation, aviation careers, and aviation safety. A section of curriculum materials for teachers includes the general aviation story, uses of the general aviation airplane, and an aircraft classification chart. Section V contains resource listings, including 12 resources for information in Alaska, 2 sources for audiovisuals, a bibliography of 12 adult and 10 juvenile books, and names and addresses of 33 associations and interest groups. The following attachments are provided: Federal Aviation Association (FAA) education materials list; a poster, "Aviation in My Community"; a brochure, "A Flying Start"; a booklet, "The Sky's the Limit"; Aircraft Owners and Pilots Association fact sheet; Federal Educational Information Exchange's FAA aviation education menu; FAA Aviation Career Education Academies mailing list flyer; a list of Alaska Department of Education equity publications; and a feedback form. (KC)

***********************************************************************
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
***********************************************************************

CE

ED 376 270

# Women and Minorities

# in Alaskan Aviation

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)
☑ This document has been reproduced as received from the person or organization originating it
☐ Minor changes have been made to improve reproduction quality

- Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

"PERMISSION TO REPRODUCE THIS
MATERIAL HAS BEEN GRANTED BY
K R Crane
TO THE EDUCATIONAL RESOURCES
INFORMATION CENTER (ERIC)."

CE 067142

ALASKAN EQUITY PUBLICATION • 1994
ALASKA STATE DEPARTMENT OF EDUCATION

BEST COPY AVAILABLE

**Walter J. Hickel**
*Governor*

**Jerry Covey**
*Commissioner of Education*

**Vince Barry**
*Director, Educational Program Support*

**Alaska State Board of Education**

Patti Norheim
*Chair*

June Nelson
*Vice-Chair*

John E. Hotzfield
*Member*

Dr. Roger O. Jarvis, USAF
*Military Member*

Beverly Ranney
*Student Member*

Don Fancher
*Member*

Stowell Johnstone
*Member*

Bob M. Walp
*Member*

Judy Norton
*Member*

# Women and Minorities

# in Alaskan Aviation

WRITTEN BY:
*Mary Lou Dordan*
*and*
*Deborah Nicholson*

EDITED BY:
*Anne Kessler*
*and*
*Naomi Stockdale*

DESIGN BY:
*Sarahgraphics*
*January 1994*

PRINTED BY:
*Alaska Litho*

Funding for this project is provided, in part, by Title IV, Civil Rights, Section 403 (c),
State Education Agency, Desegregation of Public Education Program, CFDA Number 84-004
and
Carl D. Perkins, Vocational and Applied Technology Education Act of 1990

State of Alaska, Department of Education

# TABLE OF CONTENTS

INTRODUCTION ..... 4

ACKNOWLEDGMENTS ..... 5

FOREWORD ..... 6

## I. EARLY AVIATION

**Ruth Jefford**
Pioneer ..... 8
**Bill English**
Pioneer ..... 11

*ACTIVITIES*

IA. So You Wanna Fly? ..... 14
IB. Parts of an Airplane ..... 16
IC. Airplane Assembly ..... 18
ID. What Makes An Airplane Fly? ..... 20
IE. Field Trip Guide for Aviation Education ..... 22

## II. AVIATION CAREERS

**Richard and Ramona Ardaiz**
Flight School Owners ..... 26
**Ellen Paneok**
Commercial Pilot ..... 28

*ACTIVITIES*

IIA. Careers/Interest List ..... 30
IIB. Career Categories ..... 31
IIC. Local Airport Jobs ..... 34
IID. Career Goals ..... 36
IIE. Using AKCIS ..... 37

## III. AVIATION SAFETY

**Val Aron**
FAA Operations Specialist ..... 40
**Patricia Mattison**
FAA Accident Prevention Program Manager ..... 43

*ACTIVITIES*

IIIA. Alaska Aviation Fact Sheet ..... 46
IIIB. Compass Navigation Exercises ..... 48
IIIC. Phonetic Alphabet ..... 50
IIID. Decoding Weather Observations ..... 51
IIIE. Flight Planning ..... 53

## IV. AVIATION CURRICULUM SUPPLEMENTS - FOR TEACHERS

- The General Aviation Story ........ 56
- Uses of the General Aviation Airplane ........ 63
- Aircraft Classification Chart ........ 64

## V. RESOURCES

- Resources for Information in Alaska ........ 66
- Books, Films and Videos ........ 67
- Associations/Interest Groups ........ 67

## VI. ATTACHMENTS

- FAA Aviation Education Materials List
- Poster
- Aviation in My Community
- A Flying Start
- The Sky's the Limit
- AOPA Fact Sheet
- FAA FEDIX
- FAA Aviation Career Education (ACE) Academies Info
- Alaska Equity Publications
- Feedback Form

# INTRODUCTION

Each year, Alaskan educators celebrate the contributions of individuals who have earned a place in the history of the "Great Land" of Alaska. This is particularly so during Heritage celebrations and March-Women's History Month. It is with great pleasure that the Department of Education takes part in these efforts, by producing classroom materials such as its annual Equity publication. The 1994 publication, Women and Minorities in Alaskan Aviation recognizes the crucial role of aviation in our state and features individual women and men who have played a role in its development and growth.

The topic of aviation was suggested by members of the Department's Equity Task Force two years ago. As many as seventy percent of Alaska's communities have no means of travel to and from the village, other than by airplane. Residents depend on airplanes to bring them the mail, groceries and other vital services. Many children in Alaska see and hear airplanes, or travel in them, much before they have experiences with automobiles. Per capita, Alaska has eight times as many pilots and 15 times as many aircraft as the rest of the United States. We agreed that aviation was an important topic and area to investigate. Given the role of aviation in this state, and opportunities for a range of jobs in this field, in urban and rural communities, we also wanted to encourage young women and men in today's classroom to consider preparation for occupations and careers in aviation.

As editor and Equity Project Director, I am proud to forward this curriculum to teachers in Alaska. There are many positive role models in this publication to introduce to students. As readers will soon discover, the individuals in this publication have a lot in common. Each has demonstrated determination and perseverance, even in the face of difficulty and opposition. For these persons, having a goal to strive for usually meant hard work and commitment. Their accomplishments deserve our recognition, respect and admiration. We hope teachers and students will be inspired by the examples of these men and women. They embody the frontier spirit characteristic of Alaskans at their best.

This publication is intended for use by teacher in secondary classrooms throughout Alaska. With some adjustments, along with accompanying materials, the material can be presented to younger students as well. Aviation is connected to many of the existing subject areas: communications and language arts, sciences and math, industrial arts, mechanics and engineering, geography, health and economics, to name a few. The topic also suggests that students become better acquainted with their environment, their community, including its people, and the resources available.

We invite teachers to make use of this curriculum year-round. With your feedback and suggestions, any further printing can be improved. Any part of this text and appendices may be copied for classroom and school use. **Inquiries and request for additional copies should be directed to Anne Kessler at the Alaska Department of Education, Equity Project, 801 W. 10th Street, Suite 200, Juneau, AK 99801, (907) 465-8716. Reader comments and feedback are welcome.**

# ACKNOWLEDGMENTS

The Department of Education gratefully thanks, first and foremost, Richard and Ramona Ardaiz, Val Aron, Bill English, Ruth Jefford, Patricia Mattison, and Ellen Paneok who have consented to be featured in this publication. We are indebted to them for sharing their experiences with us and our students.

We also owe a very special thanks to Deborah Nicholson and Mary Lou Dordan for conducting the interviews and writing the biographical sketches, and accompanying activities. Both have contributed to the world of aviation and education for many years. Deborah, a teacher at Clark Jr. High, Anchorage School District teaches science and computer technology. Deborah is also a private pilot and Major in the Alaska Civil Air Patrol. One of Deborah's responsibilities is to direct Cadet Programs. Mary Lou Dordan is an Aviation Education Officer with the Federal Aviation Administration. Both have spent countless hours providing instruction to youth in Alaska, about aviation.

The tasks of assembling a publication are challenging and tedious. I wish to thank my colleagues in the Department for assisting me in completing the project. Naomi Stockdale believed in the project from the very start and was most instrumental in securing funding and keeping the goal foremost at hand during the editing process. As always, Estelle Bentley was willing to interrupt her work and provide computer solutions and moral support as we evolved from first to final draft. My assistants, Melora Gaber and Bernice Donnelly assisted with keyboarding and copyright permissions. Photographers who contributed to the publication are Mary Lou Dordan, Linda Follett, and Fred Hirschmann.

The role of the graphic designer is to take the printed text and images and elevate them to a polished product which invites attention. We have had the pleasure of working with Sarah Olsen of Sarahgraphics to prepare this publication. We thank her for dedicating her time to this project, including week-ends and weekdays, to meet tight deadlines. Of course we especially value her creative and artistic contributions. The printing was executed by Alaska Litho.

In conclusion, we also wish to thank the FAA Public Affairs/Education Division of Alaska's Anchorage office for providing additional educational materials in this project. We thank the Beechcraft Corporation, and the Cessna Corporation for granting us permission to include their materials within this booklet. Materials from the General Aviation Manufacturer's Association and the Aircraft Owners and Pilots Association also supplemented our effort.

# FOREWORD

*By Ted Spencer*
*Director, Alaska Aviation Heritage Museum*

My great grandfather arrived in Alaska in 1898 to ply the Nome goldfields. As a fourth generation Alaskan, permanently affixed to my "beloved Alaska," I feel a deep sense of pride for the contribution my forefathers gave in Alaskan pioneering. Knowledge of this history, however, was hard-won. I've had the good fortune to stumble across old letters and newspaper clippings or come in contact with the elders of my surviving family line.

This innate curiosity of my Alaskan heritage has spurred me into an investigation of Alaskan history in general. During my school years in Fairbanks, Nome and Anchorage, little was spoken about the adventures and trials of the Alaskan pioneering era. My mid-life research on the subject revealed an intricate and fascinating story of the classic human spirit at work. Many Alaskan residents today may have a tendency to take the amenities of life in modern urban Alaska for granted. It wasn't always so. Many of the immigrants that arrived in early 20th century Alaska, appeared with little more than muscle and a skill. Building Alaska necessitated the import of tools, materials, equipment and some of the amenities of modern life, all of which had to be hauled in. Thus, transportation is a major key to life in Alaska as we know it today. For me, the role of aviation is the most fascinating...pioneers who built Alaska were an admirable breed of people. They were hardy and resourceful, many times exhibiting extraordinary courage and tenacity. Alaska's aviation history is one of the great chapters in American and world aviation history. Yet, there is little public awareness of the details. Alaskan aviation history in recent past was a smattering of folklore, myth and old newspaper clippings in a shoebox; an old photo album, and a fragile reel of film. Like prehistoric birds, the fossils of the old aircrafts lay scattered in the forests, mountains and tundra. At virtually the eleventh hour, we've been able to collect and consolidate sizable chunks of the story. There is a lot of work to do in assembling the history and preparing if for the "handing off" to future generations. This document is a contribution to that end.

I think the common picture of the Alaskan "bush pilot" is that of a Caucasian male. My investigation of Alaskan aviation history has revealed to me an aspect of aviation pioneers overlooked or missed by the public and historians alike.

From the first day of Alaskan flying, women played a key role in aviation activity. Lily Martin, an English pioneer aviatrix, and her husband James, brought the first aircraft to Alaska. The year was 1913. The first woman pilot flew in Alaska in 1926. Alaskan women took up training as early as 1932, still a primitive stage of aviation evolution. Not only did women fly the challenging Alaskan skyways, they worked on aircraft and owned and managed commercial aviation companies.

The aviation pioneers would have had a much more difficult time in flying Alaska were it not for the contributions of the indigenous Alaskan people. Many a pilot was saved from death via the Native and his dog team. Shelter, food, warmth and assistance was provided to the wayward air traveler by the Alaskan Natives. They had a natural curiosity in these mechanical birds that brought the outside world to their peaceful subsistence lifestyle. Many cultivated the skills to repair and fly aircraft and have distinguished careers in the aviation industry.

It is important to develop an awareness of these people's accomplishments. They are a source of inspiration for the pioneers of today and those of tomorrow.

# I. EARLY AVIATION

## Ruth Jefford

*Pioneer*

## Bill English

*Pioneer*

# Ruth Jefford

## PIONEER

Photo by: Mary Lou Dordan

Aviator, business woman, international traveler, concert violinist, sailor, and wife - Ruth Jefford challenges life everyday!

Born in an era when flying was the fantasy of the imaginative and the pastime of the daring, Ruth dreamed of sailing the skies at the very early age of 4. Enticed by the sight of a Curtis Flying boat (the first aeroplane she had ever seen) Ruth imagined flying her rocking chair through the Adirondak Mountains of upstate New York. Much to the dismay of her parents, Ruth resolutely stuck to her goal of flying and went on to become one of the first ladies of Alaskan aviation. Adhering to parents' wishes while developing a natural talent, Ruth spent five years studying music at the American Conservatory of Music in Chicago. As a concert violinist, she went on to perfect her musical skills in Paris and at the Mannes College of Music in New York.

Piercing blue eyes give one the impression that Ruth, though small in stature, misses nothing. A hearty laugh and warm nature soon put the visitor at ease as a personal history as diverse as any truly unique individual, unfolds in short quips and entertaining tales of Ruth's colorful life.

Ruth's first flight instructor also became her first husband. Jim Hurst was an engineering test pilot for an aircraft manufacturing company near her home in Freemont, Nebraska. The vivacious Ruth convinced Hurst to take her for a ride. Their first flight together lasted exactly as long as the fuel in the tanks! Wishing to impress the beautiful young woman, Hurst remained aloft as long as possible and landed on empty. They did not even have enough fuel to taxi out of the alfalfa field which doubled as the local air strip!

Ruth began flying lessons in 1937 and soloed in five hours and forty minutes. She earned her private pilot license the following summer and in some fifty six years of flying, Ruth has logged over 10,500 hours.

Following their marriage, Hurst, who then worked for the Civil Aeronautics Administration, was transferred to Anchorage, Alaska. Their plans for a leisure trip north were unexpectedly interrupted by the bombing of Pearl Harbor as the United States declared war on Japan. As the world descended into the practiced madness of war, Ruth found a certain fascination in the northern lights and the unique Territory in which she lived. By 1944 she had earned her Commercial Pilot license and Certified Flight Instructor license. As her husband helped to set up airports and navigational aids throughout the territory and hauled supplies for governmental installations, Ruth became a flight instructor at Merrill Field. Using a Taylorcraft purchased from one of her students, she taught flying lessons for several years. Demonstrated proficiency and a solid business sense earned Ruth the respect and acceptance of her peers and eliminated any prejudices commonly experienced by women in non-traditional career fields.

Anecdotes and exciting stories flow with ease when Ruth recounts her professional flying days. Although never seriously injured, she can tell of flying an experimental aircraft (including a Russian ultralight), braving all kinds of weather and dealing with all manner of clients, as well as mechanical or structural problems and dangerous landings. Once, ground-looping a Cessna 180 in Skwentna, Ruth remarked, "Only my pride was hurt". She and her passengers walked away but the plane needed substantial repairs! Over the years exciting moments have become fond memories and are now much easier to laugh about.

In addition to her career as an aviator, Ruth's love of music found an outlet as she became a charter member of the Anchorage Symphony Orchestra in 1946. Although one of only seventeen musicians in the beginning, she watched the orchestra grow and mature along with her adopted territory (and later state). Ruth served as concert master for some thirty eight years, devoting hundreds of hours to her music and the Anchorage Symphony Orchestra.

By 1957 Ruth and Hurst established a company called International Air Taxi, and began developing business contracts and lease agreements around south central Alaska. Though the business partnership prospered, Ruth and Hurst divorced in 1961. The major flight duties fell upon the shoulders of Ruth as Hurst could no longer fly following his diagnosis with diabetes. A short, busy two years later, Hurst signed the company contracts and leases over to Ruth as she became sole owner and operator of International Air Taxi. A single individual operating an air taxi service, alone in Alaska, was not an easy task. But Ruth rose to the challenge! She was everything; owner, operator, secretary, receptionist, refueler, etc. Again her professionalism and determination won her the respect and admiration of her peers and clients. For twenty years Ruth maintained a weekly mail route to Skwentna, Alaska in a Cessna 175 and later in a Cessna 180. FAA contracts and flying fuel oil kept her as busy as she wanted to be. Her thriving business included a twin engine Barron, a Cessna 206, a Cessna 180 and a Bonanza.

In 1962, Ruth caught the ear of Robert Shaw who had come to Anchorage to conduct a music festival. He asked her to join his annual concert tour to Yugoslavia, followed by a State Department sponsored cultural exchange with the Soviet Union (now Russia) which included concerts in 11 cities. As luck and timing would have it, President Kennedy chose to blockade Cuban waters in what became the Cuban Missile Crisis during the time of this Soviet tour. Ruth remembers that period with some reservation - not knowing the outcome of the United States' actions, the musicians found their predicament uncomfortable. Shaw's group were the only Americans allowed to travel in the Soviet Union during the crisis; they were well received and all returned home without incident.

Despite her world travels, Ruth continued to successfully operate International Air Taxi. In 1972, she married Jack Jefford, one of Alaska's well known aviators and a friend of ex-husband Jim Hurst (who had died in 1968). Jack had retired from the CAA/FAA and was a welcome addition to International Air Taxi. Three years later they sold the company and moved to a beautiful home overlooking Lake Wasilla in Wasilla, Alaska.

Never one to let moss grow under their feet, the Ruth team began a new air taxi service called Valley Air Transport. They operated out of Wasilla Airport and continued the weekly mail transport to Skwentna. When Jack Jefford died in 1979, Ruth Jefford continued to operate Valley Air Transport for another two years. In 1981, retirement began to look better than escalating insurance premiums. Ruth left the air taxi business and says "I've eaten better ever since!" She still maintains her Bonanza and Cessna 180 and enjoys flying when she can. Ruth states emphatically "I'm retired and I still don't have time to do anything." No doubt!

Recognized in many aviation arenas for exceptionality, Ruth Jefford has been awarded the Amelia Earhart Memorial Scholarship by the Ninety-Nines (women's pilot association), cited by the Alaska Airmen's Association for her contributions to general aviation and received the annual pioneer women's award of the OX-5 Aviation Pioneers and elected to the Aviation Hall of Fame of the OX-5 Aviation Pioneers.

Ruth once again returned to the Soviet Union in 1990 accompanying 10 Airman's Association members on a tour of the aviation educational facilities in Lenningrad and Riga - the experience being less tense than her previous trip.

In June of 1991 Ruth was amongst the seventy-five American airmen who flew thirty-five private aircraft to Providenia, Siberia, Russia. It was the experience of a lifetime and the culmination of two years' hard work and bureaucratic red tape. Departing from Nome, Alaska, crossing the Bering Strait and landing in the small mining town of Provideniya demonstrated that the Cold War had warmed enough to melt the great expanse between the American people from the east and the Russian people from the west. This historic flight saw the first legal private aircraft fly from Alaska to land on Russian soil since before World War II. The door to Siberia had been opened; just a crack - but a crack is all it takes for a really good bush pilot to plot the needed course!

In 1992 Ruth took possession of her commissioned 32 foot Gulf Pilot House sailboat in Seattle and sailed it to Seldovia with only two hands on board. An avid sailor, she moors the Arjay in Seldovia.

Ruth Jefford defies description. Born in an era that depicted women as "homebodies," Ruth used her inborn sense of business, determination, and love of life, coupled with hard work and durability to learn the lessons of life. Though most of her formal education surrounded music, she went on to become a successful aviator and businesswoman. She is warm and humorous with the strength and individuality of the true Alaskan we know and cherish. Not only a wife, concert violinist, business woman, sailor, and world ambassador, but an exceptional aviator and unique human being. Quick with a tale to tell, and a vast experience base from which to draw, Ruth Jefford can truly be called a *First Lady of Alaskan Aviation.*

# Bill English

## PIONEER

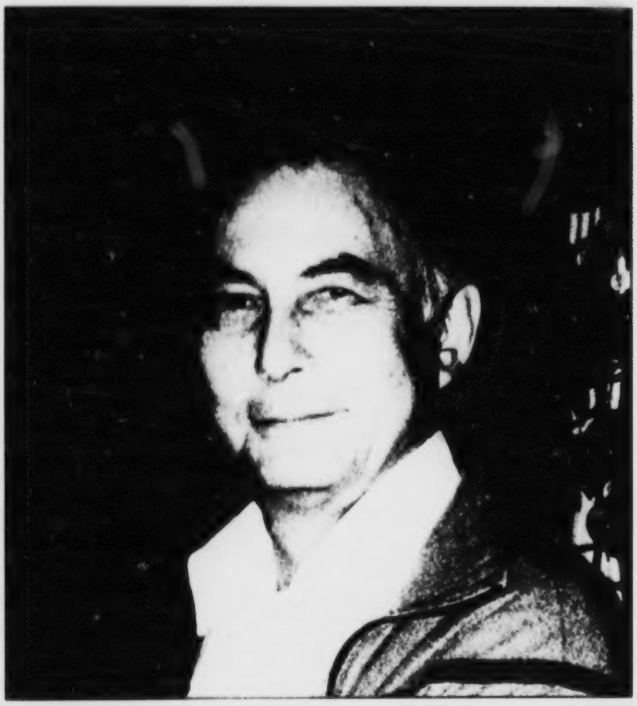


Photo by Mary Lou Dordan

The bush communities in Alaska are very fortunate to have a spokesperson like Bill English lobbying for them. His memories of his childhood, back in Wiseman, Alaska, help to confirm in his mind that education of Alaska's youth is essential to their future.

Born in January 1923, in the gold-mining community of Wiseman, Alaska, Bill well remembers a place that had less than twenty-five people. He still remembers the first airplane he saw in 1924 when Noel Wien flew into Wiseman, and the first vehicle, train, and large boat he saw while flying in his first airplane ride that took him over the Fairbanks area when he was only four years old. What an awesome feeling it was to fly like the eagles and watch the ground swiftly move under his airplane wings!

Bill grew up in contact with two cultures. His mother was an Inupiat Eskimo and his father a Caucasian man from California. He was able to learn the ways of both cultures until his family moved to Roseberg, Oregon where his father bought a 160-acre farm when Bill was around eight years old. The dream of most Alaskan goldminers at that time was to go "Outside" and buy a couple acres of land along with some fruit trees and chickens and settle down. Somehow, his father managed to buy a 160-acre farm with two cows, two horses, two chickens, two geese, some pigs, and a prune orchard. Since his father did not know anything about farming, he had to hire help to take care of the chores. The effects of the Great Depression took their toll on the family's livelihood by 1937. Seeing that financial success was not to be part of their lives in Oregon the family packed up their belongings and headed back to their former home in Wiseman. Fourteen-year-old Bill decided not to return to Alaska with his parents at that time but to go live in California with his father's sister.

Seven years later Bill returned to Alaska as a twenty-one-year-old man ready to begin a career in the Fairbanks area. One thing that still remained buried in his soul was his desire to become an airplane pilot. Since there were no flight schools at that time in the Fairbanks area Bill was at a disadvantage at finding someone to help him learn how to fly. Finally, when two local brothers began an air service business, Bill saw this as his long-awaited for opportunity to learn how to fly. He walked into their office and asked them to give him flying lessons; and the rest is history. When Bill was ready for his solo flight his instructors were a bit nervous to let their one and only student take off in their one and only airplane. Their trust in his flying abilities was not betrayed as Bill did everything correctly during that memorable flight.

Two years later, in 1944, Bill found a partner named Davie Johnson who was willing to share the costs of an Aeronca K sportster aircraft. It was a sight to behold to watch and listen to the two-seater plane with no brakes, two cylinders, and a single starter ignition. It only held ten gallons of gas and would run out of oil at about the same time as gas. Bill accumulated many hours of flight time in that old plane before he went on to fly bigger and newer aircraft with Wien Airlines.

Since pilots were scarce during that time in Alaska, many of the air carriers would go outside in search of pilots for their business. Bill had been building up a number of air hours in the Fairbanks area while increasing his familiarity with flying over Alaska tundra and mountains. After earning his commercial pilot's license, Bill headed for the Wien Airlines office looking for a job as a pilot. Not feeling exactly sure about hiring this young pilot from Fairbanks, they put him on the payroll on an hourly part-time basis and rented a two-place Taylorcraft for him to fly mail and cargo to the villages. At the same time Bill also landed a job with Northern Consolidated as a co-pilot for their DC-2 airplane. Wien Airlines did not want to lose this new Alaskan pilot to the competition so they made an offer to hire him full time. This was quite an accomplishment for a young Native man at that time.

For the next three summers and one winter, Bill got a great deal of practice in takeoff and landings when Wien sent him to Umiak to fly a gravity-meter reader in a Cessna 140 along the North Slope. They took off and landed every three to five miles as they geologically mapped potential oil fields. When Wien Airlines lost the contract for this run, Bill was hired by Alaska Airlines to fly a Bellanca high-wing, six-eight seat plane on floats to service the oil drilling camps during the winter. When this job was finished Bill returned to Wien where he began to fly the DC-3.

Of all the airplanes Bill had flown during his career his favorite is still a Cub on floats. It just is such an easy aircraft to fly and can get you into so many places in Alaska, according to Bill.

In 1948, Bill met a beautiful young woman named Shirley at the University of Alaska Fairbanks and they were married that same year. This vivacious and personable woman continues to provide a wonderful balance to the distinguished-looking man with the melodic voice. They have three children, two of which have pilot's licenses. Their son, Bill, holds a commercial pilot rating but has chosen to dedicate his efforts to his career as an attorney in Anchorage.

Bill continued to fly for Wien until his sixtieth birthday in 1983 when he reached mandatory retirement age. By that time he held the status as number two in Wien's seniority system and the best-known Native pilot in Alaska. He was unique in that he was the first Native in Alaska to earn an airline transport rating as well as the first Native to be designated an FAA pilot examiner. The young man to whom Wien was afraid to turn over one of their airplanes back in 1946 had become a check pilot for Wien, a member of the company's board of directors, and had accumulated well over 30,000 air miles.

After his retirement, Bill saw his opportunity to pursue another of his goals that was still not fulfilled. He had always wanted to enroll in the Airframe and Power (A&P) course at the University of Alaska. Every time he would start a semester, the phone would ring with a request for Bill to help teach new pilots. First it was Frontier Airlines asking him to teach pilots from Saudi Arabia in Denver. After that, MarkAir called with a similar request. Each time, Bill would put his A&P dream on hold and answer the needs of the aviation industry. Bill stayed with MarkAir as their Director of Operations until he was 65 years old. Then in 1988 Martech Corporation bought a jet and believed Bill English was just the right pilot to fly them to Russia among other places. The excitement of something new and different would not let Bill say NO and he again put his A&P studies on hold until the fall of 1992 at which time he finally finished the course and earned his certificate.

Bill continues to be a strong proponent of education. The Alaska State Legislature presented him with a citation commending him on his thirty-six and a half years of commercial aviation achievements and highlighting how he had taken time during his career to earn a degree in business and transportation. He now sits on the Board of Directors for the Cook Inlet Region and the Cook Inlet Tribal Board among others.

His current goal is to help develop an educational program whereby instructors from the larger communities can travel to the villages for three weeks at a time and familiarize young Native students to subjects to which they might otherwise never be exposed. Once the students obtain a basic understanding of the subject areas, they can better decide if they should pursue the challenge of attending the university.

Bill believes the opportunities for Natives in the villages are tremendous and that aviation is here, forever. He frequently speaks to various civic and school groups about flying in the bush. His stories are not only entertaining but informative for listeners young and old.

Bill is a man with a cause. In January 1994, Bill plans to be the proud owner of another plane as he continues his quest to encourage members of the Native communities in Alaska to stay in school, master the basics of education, and search out the diverse opportunities and careers that are available for those who seek success. A proud proponent of education, Bill is an excellent example of what one individual can do with intelligence, drive and life goals.

# *ACTIVITY IA.*

## So You Wanna Fly?

### INTRODUCTION

"So ya wanna be a pilot?" The first question is always the same! Use the FAA publication A Flying Start, and your own initiative to answer or research the following questions. Then decide if you really "wanna be a pilot."

### ACTIVITIES

1. Make a list of flight schools located nearest you or around Merrill Field and Anchorage International Airport. Call three of the schools and inquire how much it would cost someone to learn how to fly and how long it would take to earn a pilot's license.

2. Research six well-known Alaskan Bush pilots at the local library. Describe where and how they first began to fly. How is it different from pilots learning how to fly in 1994?

3. If you were going to design an airplane's interior with memorabilia from the 1940's, what would you use. What kind of fabrics? What kind of lights? What kind of foods? What kind of magazines?

4. Plot a course from Anchorage to Fairbanks with an aeronautical map. Calculate how long it will take you to complete the trip in perfect weather if you can fly 80 knots per hour. How will your flight time be effected if you run into a headwind? Fog? Rain? Sleet? Would it make a difference in your calculations if you took a 100 pound of glacier ice with you on the airplane?

5. What is Search & Rescue in Alaska? Is it part of the Air Force, the State of Alaska, the Civil Air Patrol, the F.A.A., some other government agency? How much does it cost to search for missing or overdue aircraft? Search & Rescue crews use a special grid pattern to look for missing aircraft. Interview a member of the Civil Air Patrol to find out how they conduct a search.

6. Working in groups of four, list ten characteristics you think aviators should have. Discuss your ideas with the other members of the class.

7. How many kinds of pilot's licenses or flight certificates are there? What are the differences among the various certificates?

8. Pilots in Alaska are required to carry certain kinds of survival gear in their airplanes. Make a list of these emergency items and describe why each one is so important.

## ACTIVITY IA.

### So You Wanna Fly? (CONTINUED)

9. Explain the difference between Instrument Flight Rules (IFR) and Visual Flight Rules (VFR).

10. What is the Federal Aviation Administration? What is the National Transportation & Safety Board? How do they differ?

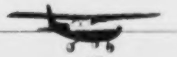
11. Using the legend on an aeronautical chart, locate five separate airstrips, five navigational aids, and five lakes upon which a pilot could land his or her plane. Does a pilot follow the same rules at each airstrip? Do they all have a tower? Draw a picture of your local airport. Include any navigational aids, barriers that geographically impact air traffic.

12. Write a story describing an airplane ride from Denali Park to Nome during the month of August. Include a description of what each of your senses (sight, sound, touch, smell & taste) are experiencing during the flight.

13. If you were flying to Bethel from McGrath in a small airplane with one other passenger and encountered a sudden storm front, what would you do? You do not have enough fuel to turn around and return to Bethel. There is no airport nearby.

14. What is vertigo? Do only pilots experience this sensation?

15. Private pilots are required to have a physical examination every three years. Why do you think it is so important for pilots to stay in good physical condition?

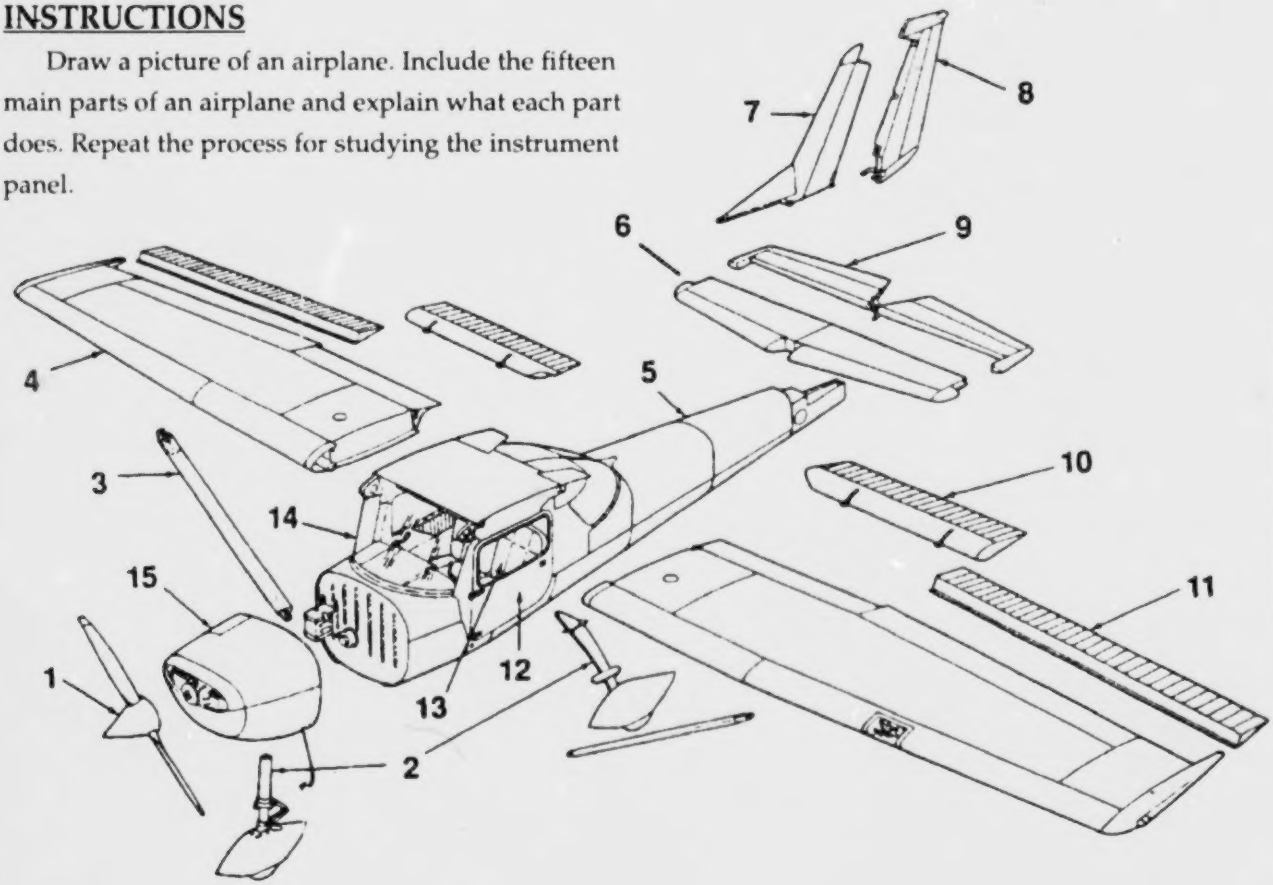


# ACTIVITY IB.

## Parts of an Airplane

### INSTRUCTIONS

Draw a picture of an airplane. Include the fifteen main parts of an airplane and explain what each part does. Repeat the process for studying the instrument panel.



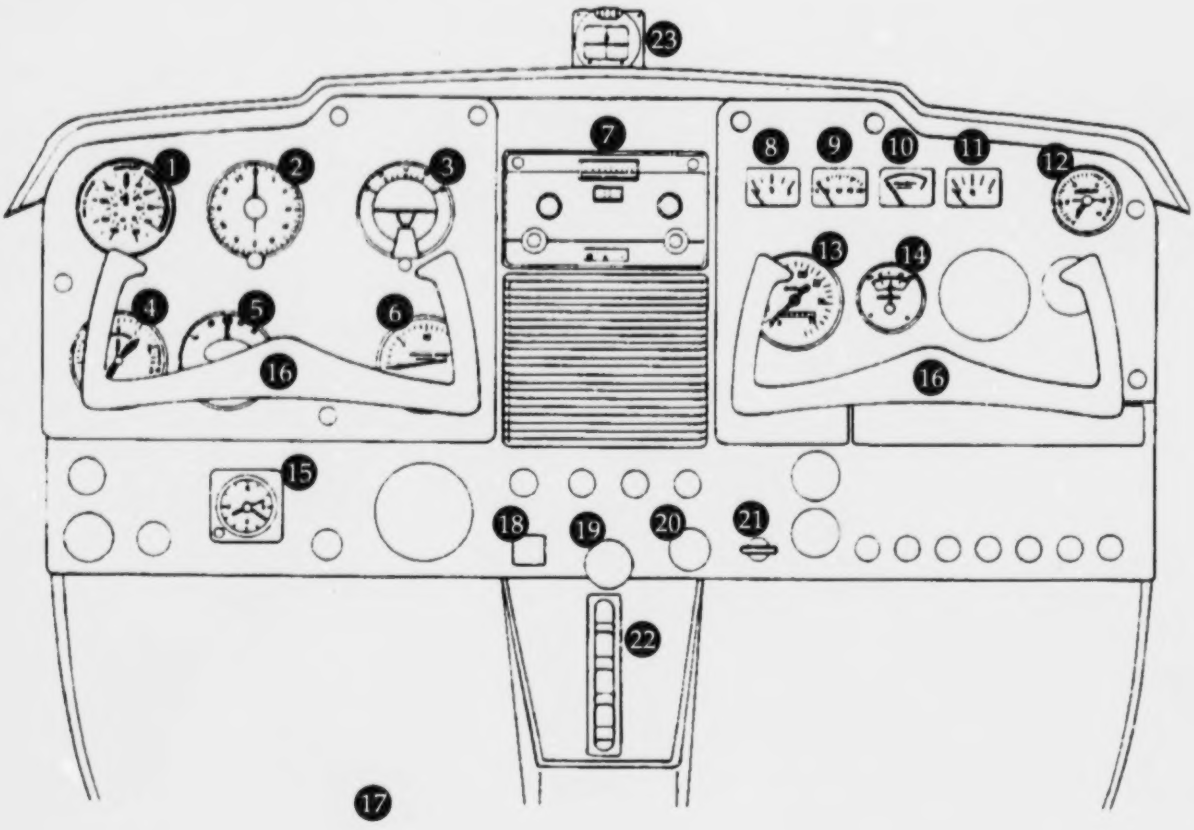
Courtesy Cessna Aircraft Company

## THE MAIN PARTS OF AN AIRPLANE

1. Propeller
2. Landing Gear
3. Wing Strut
4. Wing
5. Fuselage
6. Horizontal Stabilizer
7. Fin and Dorsal
8. Rudder
9. Elevator
10. Left Wing Flap
11. Left Wing Aileron
12. Door
13. Seat
14. Wingshield
15. Engine Cowl

# *ACTIVITY IB.*

## Parts of an Airplane (CONTINUED)



## INSTRUMENT PANEL

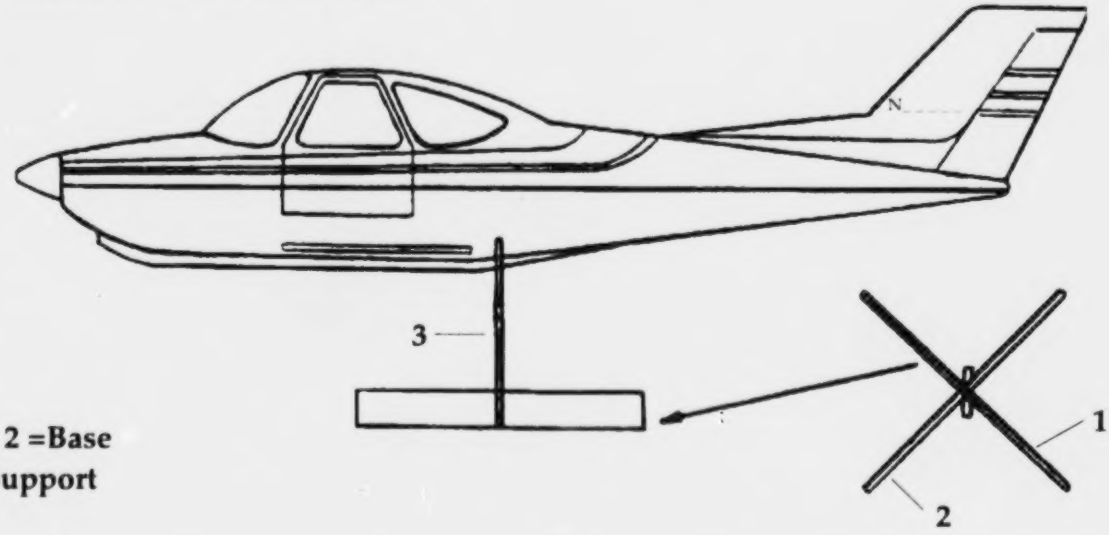
1. Airspeed indicator
2. Gyroscopic compass
3. Artificial horizon
4. Altimeter
5. Turn-and-bank indicator
6. Verical speed (rate-of-climb—decent) indicator
7. VHF navigation—communication radio
8. Fuel gauge (left tank)
9. Oil pressure gauge
10. Oil temperature gauge
11. Fuel gauge (right tank)
12. Suction indicator (run by vacuum pump, which activates gyrosopic intruments)
13. Tachometer (measures revolutions per minute of propeller)
14. Battery—generator indicator
15. Clock
16. Control wheel (dual)
17. Rudder pedals
18. Carburetor heat control
19. Throttle control
20. Fuel-air mixture control
21. Wing flaps control

## ACTIVITY IC.

### Airplane Assembly

## INTRODUCTION

To reinforce students' knowledge of airplane parts, give each student an opportunity to assemble his or her own plane and paint it. Students should give their airplane a 5 digit ID which is preceded by N.



**1 & 2 =Base**
**3=Support**

## AIRPLANE ASSEMBLY INSTRUCTIONS

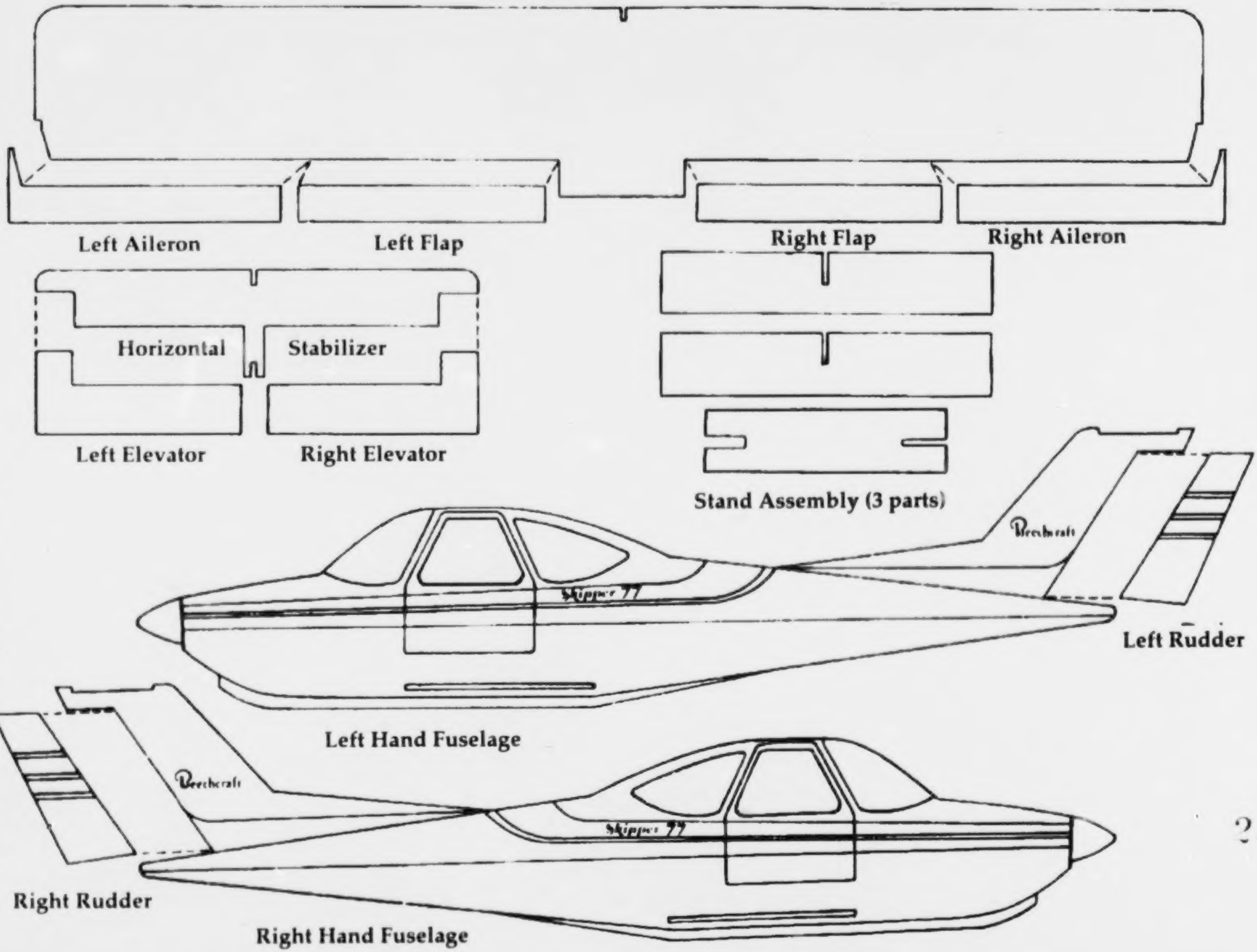
1. Reproduce Student Activity Sheet on the following page and give one copy to each student.
2. Have students cut out the various parts and paste to tablet back or stiff poster board. (Note: Paste only the right hand side of the fuselage and rudder to the cardboard.) USE VERY LITTLE PASTE.
3. Color airplane
4. Cut out the parts that have been pasted to the cardboard.
5. Paste left hand side of fuselage to the cardboard fuselage and paste left rudder to right rudder.
6. Insert wing through fuselage and attach flaps and ailerons to wing with transparent tape on the underside.
7. Attach rudder to tail assembly with transparent tape (one side only).
8. Attach elevators to horizontal stabilizer with transparent tape on the underside.
9. Attach elevators and horizontal stabilizer assembly to tail assembly.
10. Assemble stand and mount airplane as shown below.

Note: After assembly is completed place a small drop of glue on each side of the fuselage by the wing—this will hold the wing stationary. Place a drop of glue on the underside of the horizontal stabilizer.

## ACTIVITY IC.

## Airplane Assembly (CONTINUED)

### BEECHCRAFT SKIPPER


Left Aileron
Left Flap
Right Flap
Right Aileron
Horizontal
Stabilizer
Left Elevator
Right Elevator
Stand Assembly (3 parts)
Beechcraft
Skipper 77
Left Rudder
Left Hand Fuselage
Beechcraft
Skipper 77
Right Rudder
Right Hand Fuselage

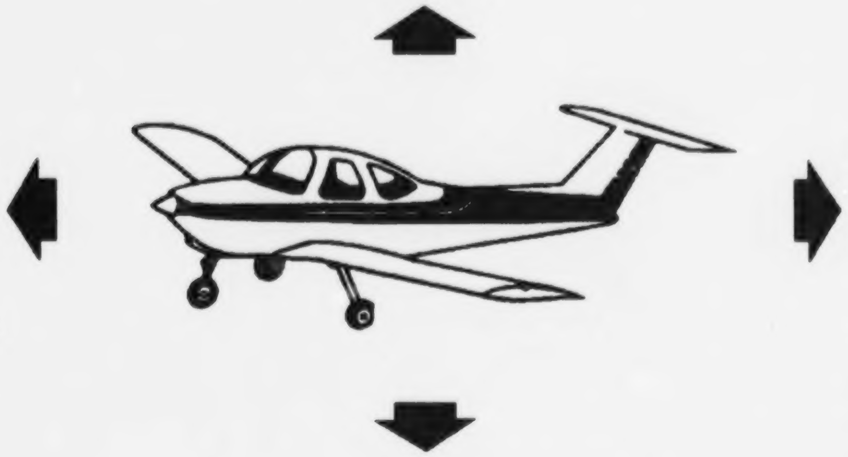
# *ACTIVITY ID.*

## What Makes an Airplane Fly?

### INSTRUCTIONS

Using the diagrams below, explain to a partner how an airplane flies. What are the four main principles of flight?

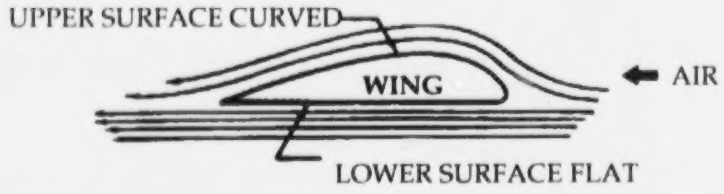
**LIFT** is a partial vacuum created above the surface of an airplane's wing causing the wing to be "lifted" upward.



**THRUST** is a force created by a power source which gives an airplane forward motion.

**DRAG** is a force which slows the forward movement of an airplane through the air.

**GRAVITY** is a force pulling down on the airplane.



## *ACTIVITY ID.*

### What Makes an Airplane Fly? (CONTINUED)

**INSTRUCTIONS**

Draw connecting lines from each word to the correct definition.

THRUST

LIFT

GRAVITY

DRAG

**...is a force which slows the forward movement of an airplane through the air.**

**...is a force pulling down on the airplane.**

**...is a force created by a power force which gives an airplane forward motion.**

**...is a partial vacuum created above the surface of an airplane's wing causing the wing to be raised upward.**

## *ACTIVITY IE.*

## Field Trip Guide for Aviation Education

### WHY TAKE A TOUR?

Many community members have a great deal to share with students concerning the many aspects of the aviation and aerospace industry. An opportunity to listen to and question such people enriches a school program and draws a connection between education and real world careers. A tour or research field trip can provide a visual concept of many careers in the field of aviation/aerospace and allows students to form realistic ideas and opinions about the field.

### HOW TO BEGIN!

To use the community as a learning center, teachers need information about aerospace facilities, people, places of interest, and services that are accessible and willing to provide tours for school students.

### A. PLANNING

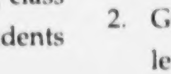
1. The teacher should plan the tour to fit the individual or facility being visited. Make sure that students are really interested in visiting or listening to your planned activity. Ask yourself:
    a. Is this of genuine interest to my students?
    b. Is this suitable for this age group?
    c. Is this activity clearly relevant to the current curriculum?
    d. Does this fit into the sequence of student work?
    e. Is the experience economical in lieu of other media presentations?
2. The teacher should visit the facility or talk with the individual prior to the class activity to develop an itinerary.
3. Develop student interest with pre-planning. Set the scene, research topics/backgrounds, and clearly develop the purpose for the activity. Using class assignments, films, photographs, etc., let students explore and prepare questions for the tour.
4. Go over what the students are to observe and what is expected of them behaviorally. Be clear with rules and restrictions.
5. Prepare for a proper follow-up of the tour. Just as good planning makes for a smooth trip, post-discussions, activities, assignments, etc. bring more value to the activity and provide concrete closure. Be sure to answer questions and point out unusual or new information. Some good follow-up activities may include:
    a. Group projects such as models, drawings, dioramas, etc.
    b. Written articles for publication in the school or local news.
    c. Bulletin board displays.
    d. A thankyou letter, card or gift for the host individual or facility.

### B. INITIAL CONTACT

1. Be sure to check with your local school district and proceed in the proper manner.
2. In making contact with the individual or facility be sure to get information on:
    a. Dates and times.
    b. Limitations of size, age or physical ability.
    c. Number of hosts or guides provided.
    d. Objectives of the tour or presentation
    e. Any particular or specific safety guides that students should be made aware of prior to the tour.

### C. LOGISTICS

1. BE SURE TO GET PERMISSION FROM THE PROPER AUTHORITIES IN THE SCHOOL DISTRICT! Check all school regulations for restrictions, travel arrangements, etc.
2. Get parent permission in writing along with a release for medical care in case of an emergency.



3. In the event that personal transportation is used to move students, be sure of the school district's requirements and provide clear directions. Be sure drivers know where to meet upon arrival.
4. Be sure of your host names and correct titles. Introduce individuals and other persons providing information to students and chaperons.
5. Keep to your established itinerary. Attempt to keep students moving or involved in listening. Help students get answers to their questions. Ensure courteous participation by students.
6. Supervision should be the responsibility of the teacher and chaperons. Do not leave your group or depend on the host to provide discipline. Make sure you have an adequate number of responsible chaperons to insure class coverage.

## WHAT TO TOUR

The first step is to contact people in the aviation field for ideas. If you are a pilot yourself, you may already be acquainted with a wide range of aviation locations and possibilities. If you have no idea where to begin, aviation buffs are more than willing to talk your leg off! You can begin by simply talking with active pilots, calling an airport manager, contacting the Federal Aviation Administration (FAA) or your local Flight Service Station (FSS). You will find that your list of resources will grow rapidly.

**A. Airports:** There are over 580 airports in Alaska. They range in size from small, private strips to large international terminals like Anchorage International Airport. Most airports have an airport manager. The airport manager is a good place to start the process.

1. Facilities: runways, ramps, hangars, terminals, seaplane bases or ski strips.
2. Discussion topics:
   a. Number and type of planes or helicopters at the airport.
   b. Companies or venders on the airport.
   d. Employment opportunities, type & style of work.

**B. Flight Service Stations:** These manned stations communicate with pilots in person, by telephone, and by radio to provide information on current or forecast weather, filing and closing flight plans, air traffic control clearances, etc.

1. Facilities: weather charts and reports, radio consoles, aviation maps and other planning materials.
2. Discussion topics:
   a. Filing flight plans.
   b. Weather and briefings.
   c. Local traffic patterns, special routes, etc.
   d. Qualifications for employment/training available.

**C. FAA Air Route Traffic Control Center:** This major facility is located in Anchorage and services the entire state. It is known to pilots as ***Anchorage Center*** and is one of 22 similar control center facilities in the United States.

1. Facilities: radar consoles, training facilities and classrooms, laboratories, radio consoles.
2. Discussion topics:
   a. Sample communication between pilot and controller.
   b. Identification of airplanes - size/type/style.
   c. Training programs and required education.
   d. History of instrumentation used.

**D. Fixed Base Operator:** These companies (FBO) provide a variety of services to aircraft owners and the public. They usually house flight training centers, charter flight companies, fuel, storage, maintenance, and aircraft sales.

1. Facilities: offices, flight dispatch counter, classrooms, maintenance shops, aircraft, etc.
2. Discussion topics:
   a. Type and style of aircraft available.
   b. Employment opportunities / training / education.
   c. Availability of flight training.
   d. What it takes to become a pilot.
   e. Economics of running an aviation business.

**E. Airport Control Towers:** Airport control towers (ATC) have one distinct job to accomplish and that is to control traffic at the airport both in the sky and on the ground. This includes information and instructions to pilots; taxi information, control of landings and take-off, weather briefings for the immediate airport, etc.

1. Facilities: tower "cab" with radio consoles, light signals, radar consoles, etc. Towers with radar usually house the air traffic radar scopes in a separate room.
2. Discussion topics:
   a. Typical conversations between pilot and controller.
   b. Standardized terminology.
   c. Rules for right-of-way.
   d. Security measures and need for control.
   e. Communication with planes which do not have radios.
   f. Emergency procedures for accidents and incidents.

**F. National Weather Service:** The National Weather Service (NWS) usually resides in an office complex with satellite technology. Employees take, record, and report weather observations, make and transmit local forecasts, issue storm warnings and reports, etc.

1. Facilities: weather instruments, weather balloons, weather maps, teletype and computer reports and forecasts, radar scopes for local and national areas.
2. Discussion topics:
   a. What weather information is important to aviation .
   b. Sources of information available to the NWS.
   c. Occupations using the NWS.
   d. Training and education of forecaster.
   e. Support personnel required.
   f. Material generated and available to the public (charts, satellite pictures, LandSat photos, etc.)

**G. Airline Offices:** Visiting airline offices and terminals provides a good opportunity for students to see the aviation industry on a large scale. It can demonstrate the variety of jobs available as well as a wide differentiation in education and training required.

1. Facilities: offices, terminals, planes, ramps, etc.
2. Discussion topics:
   a. Employee training and education.
   b. Job variety and cooperation.
   c. Economics of running a competitive business.
   d. Food service for planes.
   e. Dispatch and service to customers.
   f. Possibilities for promotion and professional growth.

**H. Military Aviation Facilities:** A variety of military installations exist in Alaska. Most of these have some form of aviation facility. Larger bases can encompass the entire aviation world. Smaller bases may simply be supported by airlift or helicopter service. Military installations are generally cooperative in providing tours and speakers for educational purposes. The Public Affairs office should be contacted for a list of resources, activities, and tours available.

1. Facilities: A wide range of facilities exist. Contact your local base or installation. Do not forget to include the Coast Guard, the Air National Guard and Army National Guard, and Civil Air Patrol.
2. Discussion Topics:
   a. Equipment and mission of the particular base.
   b. Training and recruiting.

**I. Museums and Galleries:** Each individual community Chamber of Commerce can provide information on local museums and galleries which contain aviation related information, static display, resources, etc. Two major museums in Alaska which deal with aviation are the Alaska Aviation Heritage Museum near the Anchorage International Airport, and the Museum of Alaska Transportation and Industry at Mile 46.5 Parks Highway in Wasilla, Alaska. Tours and seminars are available.

# II. AVIATION CAREERS

## Richard and Ramona Ardaiz

*Flight School Owners*

## Ellen Paneok

*Commercial Pilot*

# Richard and Ramona Ardaiz

## FLIGHT SCHOOL OWNERS

Photo by Mary Lou Dordan

The very essence of the word "teamwork" can be witnessed after spending even just 5 minutes with Richard and Ramona Ardaiz at Aero Tech Flight School. This husband and wife team is the ultimate of every success story. They portray every axiom that has ever been created relating to the power of true teamwork.

Richard (Dick) Ardaiz took his first flight in 1939 with an old barnstormer named Randolph Scott. Hooked on flying, Dick would save his money and hitchhike out to the airstrip for thrilling rides away from the boundaries that limited him so on the ground. He acquired his private pilot license in 1942 soon after World War II started and joined the Army Air Corps as a pilot. Before Dick could officially "earn his wings" as a military pilot the war ended with the dropping of atom bombs on Japan. At the time of his discharge in 1945, there were 36,000 pilots in training within the Army Air Corps.

Dick returned to Long Beach, California after the war, and with the help of the G.I. and Veteran's Bills, Dick earned his commercial, instrument, and flight instructor ratings. He did flight instruction and some charter work to make ends meet and in 1947 Dick met the "girl of his dreams." A young woman who made "the best strawberry malts he had ever tasted ". She won his heart and on January 30, 1948, they became Richard and Ramona Ardaiz.

About two years later, their first son was born and Dick realized his family responsibilities had grown faster than his income. He began to work in the evenings at the Long Beach Douglas plant to augment their income along with other odd jobs like woodworking, sash and door work, and of course flight instruction. Finally, one day, in 1952 he began thinking about relocating somewhere else other than California. He had heard of a place called Alaska and that it was a great place to fly. According to rumors, there were a lot of flying jobs and people who needed pilots in Alaska. So he shut off the table saw one day and went home to suggest to Ramona they might think of going to Alaska. When she asked, "When?" he answered, "Oh, in the next day or two." Two sunsets later Dick, Ramona, and their two-year-old son piled their belongings into a 1950 Chevy two-door coupe and headed north to their new home.

Once in the "Great Land" Dick signed on as a pilot with Northern Consolidated Airlines in 1952 where he flew DC-3s for eleven years. When Northern Consolidated merged with Wien Airlines Dick continued his tenure with this well-established business known as the oldest airline in the United States. He kept busy flying the Curtis C-46, Fairchild 27 turboprops, Fairchild 227, Boeing 737 jets, and 727 three-engine jets.

In February 1956, Dick and Ramona established a small flight instruction business in Anchorage called Aero Tech, which Ramona presided over while Dick continued to fly for Wien. By December 1968, the business had grown large enough to necessitate a move to larger facilities. So Dick and Ramona packed up their little one-room shop, and moved across Merrill Field into their brand new building, where they are still located today. In November 1985, federal regulations required Dick to retire from commercial piloting at age 60, and ironically 30 days later in December 1985, Wien went out of business.

Together, Dick and Ramona have dedicated themselves to their flight school, and Aero Tech has flourished over the years. They now have six flight instructors, four line people to take care of the aircrafts, and four office personnel. They operate on two shifts a day that keep the office active from 7:00 a.m. to 9:00 p.m., with fourteen aircrafts available for instruction. They are proud to report their students generally attain a private pilot license in 55 hours, which is quite commendable, since the national average is 70-72 hours. Ramona still reports for duty every day as does Dick. They are very proud to have two of their five children working in the business with them. Four out of five of those children have a private pilot's license.

There was a steady stream of students as the years passed at Aero Tech. Dick and Ramona graduate approximately 80 students every year. No matter where you go in the State of Alaska you will likely cross paths with students from Aero Tech. When Dick and Ramona talk of other good friends and students, it sounds like an excerpt from the Who's Who list of Alaska.

It took a great deal of hard work and long hours to reach the level of success enjoyed by Dick and Ramona today. When asked what they plan to do next and if retirement is anywhere in the picture, they just look at each other and smile. Dick casually notes, "I guess we will retire when we get old, but right now I still have more dreams and goals to attain." Even rare free time has come to revolve around aviation: Ramona is a designated FAA written test examiner and Dick is a FAA pilot and works as a written examiner.

It's a far cry from her dream as a young woman to own her own gift shop. Still, Ramona delights in the thousands of people who come through her office doors and to spend time with her and her family.

Dick and Ramona cannot seriously imagine doing anything else besides running Aero Tech. They look forward to getting up and going to work everyday. Dick commented, "there is no good reason to try anything else when we have so much fun where we are."

When time permits Dick and Ramona, they might sneak off to spend a month at their place in Hawaii. They hope to someday take a driving tour throughout the United States, but for the time being a month in Hawaii will be their treat to themselves. Even a trip to Hawaii is not all earthbound for Dick. A twinkle appears in his eyes as he talks about his plans to catch the tradewinds and go gliding for 2-3 hours every other day during their next vacation in the islands.

After 38 years in the business, Dick and Ramona have no regrets. They still believe, as they did back in 1956, that the three most important factors in flight training in order of importance were SAFETY, GOOD, TRAINING, and MAKING MONEY.

This respectable gentleman from Texas of Basque Spanish/German parentage and the lady who made exceptional strawberry malts continue to make their mark in the aviation history of Alaska. They will undoubtedly continue to provide excellent instruction for many future pilots in this state.

# Ellen Paneok

## COMMERCIAL PILOT

Photo by Fred Hirschmann

A good example of a woman who knows no boundaries is Ellen Paneok. Born in Kotzebue, Alaska in October of 1959, her mixed heritage (Eskimo, German, Cherokee and Irish) provided a rich and varied background. Ellen knew at the age of 14 that aviation had to be a central part of her life. As a young teenager, she sat reading Pilot's Magazine and felt the lure of flight calling her. Little did she know back then that her future would be molded around her skill in the cockpit of an airplane.

As her father's military career moved the family to Manassis, Virginia, Ellen began to learn some very hard lessons. The prejudices that spare no gender or age, taught her the first lesson of the day, "to run very fast". Frequently chased into the nearby woods, she found refuge from the bitter name-calling, and threats of physical abuse in the forest. The other children would not enter the woods and Ellen soon discovered that her woody haven was home to a pack of wild boars. Her escape route one day turned into a test of survival skills as the ferocious boars chased her up a tree.

Ellen left the east coast with little regret in 1970 when her family returned to Alaska. Home once again, it was only a few years before Ellen announced to her family that she intended to become an air show and airline pilot. Her family thought flying was a waste of Ellen's time and money. They tried, without success, to discourage her interest in an aviation career. Her father had taken a job with the FAA and worried about his daughter's obsession and her idea of becoming a commercial pilot.

As Ellen approached adulthood, that irrepressible desire to fly continued to grow and mature. Upon receiving her 1976 Cook Inlet Native Corporation dividend check for $1,500.00, Ellen headed, non-stop, to the nearest flight school. There, she put her money on the desk and announced that she wanted an instructor to teach her to fly. A quiet and shy individual, Ellen stood on the threshold of what was to become a highly successful career in the world of aviation.

The young 17 year old Ellen was to again endure the ridicule of peers as she rode the bus to the airport for flying lessons. Quiet determination and strength of will pushed her closer to the dream of flight with each new lesson. Her favorite mode of transportation was an airplane and the sky became her highway. Nothing else mattered as she continued her flight training. In fact, with her head in the clouds, it wasn't until two years latter that she finally put her feet on the ground long enough to learn to drive a car! When the money ran out, the ever resourceful Ellen secured student loans to pay for additional classes and lessons. By the time she was 27, Ellen had accumulated 1,500 hours of flight time and earned single engine, commercial, and multi-engine ratings. Armed with the necessary skills and experience, Ellen was ready to tackle the business world.

Another dream for Ellen was to become an aerobatic pilot. She hired one of the top airshow aerobatic pilots named Duane Cole to teach her the aerobatic ropes. Unfortunately, she was only able to complete about 200 hours of air time when her blood pressure became too high to continue flying. She was forced to discontinue aerobatics. Since then, Ellen has redesigned her habits and is eating more nutritional food. Prior to her blood pressure problems, Ellen's diet included muktuk, seal, and lots of junk food. She has lost 56 pounds and there is still a twinkle in her eye when she mentions aerobatic flying. Knowing Ellen's drive and determination the dream of aerobatic flying will not remain on hold for long!

For the next seven years, Ellen worked for some well known bush air carriers such as Ryan Air, Barrow Air, and Cape Smythe Air. Commercial flying took her all over Alaska as she became familiar with villages like Barrow, St. Mary's, Aniak, Bethel, and McGrath. She was afforded the luxury of flying as a "transient" pilot out of Barrow which allowed her maintain a residence in Wasilla, Alaska. In 1994, Ellen is back to Cape Smythe Air, full-time. Between work in the past or when she needed time away from the competitive world of aviation, Ellen headed home where ivory and an awl stylist awaited.

A talented scrimshaw artist, Ellen is considered an expert on native culture and scrimshaw. She is a strong proponent of marketing native art despite recent objections to the use of ivory for any reason. During the Summers of 1992 and 1993, Ellen travelled the Alaska Marine Highway aboard the state ferry system as a resident expert on native culture and scrimshaw. On her many trips (nine in all) she proudly talked of her Eskimo heritage as she displayed and sold her work. As much as Ellen enjoyed creating the delicate images on ivory, she knew this would never serve as a career. The earning potential of a good bush pilot far out weighed that of a starving artist. With the decreasing availability of ivory and a rapidly developing resistance among the general public for selling ivory, Ellen decided to devote the majority of her time and effort to aviation. Scrimshaw became a satisfying and profitable hobby as her attention focused once again on flying.

For years, Ellen dreamed her ultimate dream- to someday own her own ranch where she could just fly and restore antique airplanes. In 1986, the dream began to unfold, touching reality ever so slightly with the purchase of a 1933 Fairchild in desperate need of restoration. The $16,000.00 price tag rapidly grew to include another $13,000.00 as hard work and diligence paid off. Ellen sold the restored vintage aircraft to the Alaskaland Museum in Fairbanks for $32,000.00. She is currently working on restoring a 1933 Stinson SRJR. Only 87 of these aircraft were ever manufactured in the U.S. - a rare find!

Over the years Ellen's reputation as an exceptional pilot has preceded her . She has frequently been approached by air carriers such as ERA and MarkAir to fly commercially. She is well recognized in the field of aviation in Alaska - an enviable position for a young native female. Ellen quips, "I was born to stir the pot" . And stir the pot she does - with a great deal of skill and talent. When not flying, creating scrimshaw, or restoring antique aircraft, Ellen is busy writing letters to state and federal legislators about issues important to the state of Alaska. Ellen has been featured in Alaska Magazine. Later this year, the Smithsonian Air and Space Museum will fly Ellen to Washington D. C. for an interview to be included in their latest publication on women and aviation.

As 1994 dawns new and challenging, Ellen has heard the call of beautiful Barrow beckoning a return to its breath-taking sunsets on the tundra and the its pristine arctic ocean. Flying for Cape Smythe Air once again, how long before the need "to stir the pot" some more directs Ellen towards new horizons, new challenges, and new adventures? Only time and Ellen herself will tell.

# ACTIVITY IIA.

## Careers in Aviation/Areas of Interest

### INSTRUCTIONS

Make a list of every job you can think of that involves aviation. Using the attached list, see how many you did not think of. Of the interests listed, which are most similar to yours?

### AREAS OF INTEREST

| AVIATION OCCUPATIONS | Bookkeeping | Business Machines | Electricity | English | Health | Machine Shop | Mathematics | Mechanical Drawing | Mechanics | People | Photography | Radio | Science | Sheetmetal | Shorthand | Speech | Typing | Welding | Woodworking | Writing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Accountant | ■ | ■ |  |  |  |  | ■ |  |  | ■ |  |  |  |  |  |  |  |  |  |  |
| Aerial Photographer |  |  |  |  |  |  |  |  |  |  | ■ |  | ■ |  |  |  |  |  |  |  |
| Aeronautical Engineer |  |  |  |  |  |  | ■ |  | ■ |  |  |  | ■ |  |  |  |  |  |  |  |
| Aircraft Salesman |  |  |  | ■ |  |  | ■ |  |  | ■ |  |  | ■ |  |  | ■ |  |  |  |  |
| Airframe Mechanic |  |  |  |  |  |  |  | ■ | ■ |  |  |  | ■ | ■ |  |  |  | ■ | ■ |  |
| Airline Pilot |  |  |  |  |  |  | ■ |  | ■ | ■ |  |  | ■ |  |  | ■ |  |  |  |  |
| Air Traffic Manager |  |  | ■ | ■ |  |  | ■ |  |  | ■ |  | ■ |  |  |  | ■ |  |  |  |  |
| Corporate Pilot |  |  |  |  |  |  | ■ |  | ■ | ■ |  |  | ■ |  |  |  |  |  |  |  |
| Design Draftsman |  |  |  |  |  |  | ■ | ■ |  |  |  |  | ■ |  |  |  |  |  |  |  |
| Electronics Engineer |  |  | ■ |  |  |  | ■ | ■ |  |  |  |  |  |  |  |  |  |  |  |  |
| Engine Mechanic |  |  |  |  |  | ■ | ■ | ■ | ■ |  |  |  | ■ |  |  |  |  |  |  |  |
| Flight Attendant |  |  |  | ■ | ■ |  |  |  |  | ■ |  |  |  |  |  | ■ |  |  |  |  |
| Flight Engineer |  |  |  |  |  |  | ■ |  | ■ | ■ |  |  | ■ |  |  | ■ |  |  |  |  |
| Flight Instructor |  |  |  | ■ |  |  | ■ |  |  | ■ |  |  |  |  |  | ■ |  |  |  |  |
| Flight Surgeon |  |  |  | ■ | ■ |  |  |  |  | ■ |  |  | ■ |  |  |  |  |  |  |  |
| Flight Test Mechanic |  |  |  |  |  |  | ■ |  | ■ |  |  |  | ■ |  |  |  |  |  |  |  |
| Ground Radio Operator |  |  | ■ | ■ |  |  |  |  |  |  |  |  |  |  |  | ■ |  |  |  |  |
| Ground School Teacher |  |  |  | ■ |  |  | ■ |  |  | ■ |  |  | ■ |  |  | ■ |  |  |  |  |
| Instrument Mechanic |  |  | ■ |  |  |  | ■ |  | ■ |  |  | ■ | ■ |  |  |  |  |  |  |  |
| Maintenance Inspector |  |  | ■ |  |  |  | ■ |  | ■ |  |  | ■ |  |  |  |  |  | ■ | ■ |  |
| Mathematician |  |  |  |  |  |  | ■ |  |  |  |  |  | ■ |  |  |  |  |  |  |  |
| Mechanical Engineer |  |  |  |  |  |  | ■ | ■ | ■ |  |  |  | ■ |  |  |  |  |  |  |  |
| Metallurgist |  |  |  |  |  |  | ■ |  |  |  |  |  | ■ |  |  |  |  |  |  |  |
| Meteorologist |  |  |  |  |  |  | ■ |  |  |  |  |  | ■ |  |  |  |  |  |  |  |
| Military Pilot |  |  |  |  |  |  | ■ |  | ■ |  |  |  | ■ |  |  |  |  |  |  |  |
| Navigator |  |  |  |  |  |  | ■ |  |  |  |  | ■ | ■ |  |  |  |  |  |  |  |
| Public Relations |  |  |  | ■ |  |  |  |  |  | ■ |  |  |  |  |  |  |  |  |  | ■ |
| Scientist |  |  |  |  |  |  | ■ |  |  |  |  |  | ■ |  |  |  |  |  |  |  |
| Secretary | ■ | ■ |  | ■ |  |  |  |  |  |  |  |  |  |  | ■ |  | ■ |  |  |  |
| Stenographer |  | ■ |  |  |  |  |  |  |  |  |  |  |  |  | ■ |  | ■ |  |  |  |

## ACTIVITY IIB.

### Career Categories

## I. SERVICES

- **Flight Attendants**
- **Passenger Service Agents**
- **Operations Managers**
- **Office Workers**
- **Ramp Agents**
- **Line Service Workers**
- **Kitchen Workers**
- **Catering and Cabin Expediters**
- **Cargo Handlers**
- **Baggage Handlers**
- **Baggage Clerks**
- **Air Freight Agents**
- **Aircraft Fuelers**
- **Interior and Exterior Cleaning**

**Flight Attendants** assist passengers with their needs during flight. They make certain that safety rules are followed and serve meals and beverages. When passengers require attention due to illness, handicaps, age, or have problems with children, the flight attendants assist.

**Passenger Service Agents** help passengers who require special attention. A person dependent upon a wheelchair or parents traveling with young children have special needs. Agents sometimes assist with making reservations and writing tickets.

**Operations Managers** supervise reservation agents, ticket agents, passenger service agents, sales representatives, sales managers and others in the office areas.

**Office Workers** perform duties common to most businesses.

**Ramp Agents** supervise servicing, loading and unloading of aircraft.

**Line Service Workers** are responsible for parking, securing, fueling and service needs of aircraft at the airports.

**Kitchen Workers** are involved in meal preparation for employees and airline passengers.

**Catering and Cabin Expediters** move food from the kitchens to the planes.

**Cargo Handlers** load and unload freight.

**Baggage Clerks** check in baggage at flight time. They also assist in locating lost baggage at the end of a flight.

**Baggage Handlers** move baggage from the airplane to the terminal and put it on racks or carousels for passenger pick up.

**Air Freight Agents** weigh freight, make out invoices and put tags on the freight.

**Interior and Exterior Cleaning crews** go into the airplane when the passengers have left the airplane to clear the cabin and replace supplies.

# II. TECHNICAL

**Flight Service Specialists**
**Air Traffic Controllers**
**Ground Radio Operators and Teletypists**
**Meteorologists**
**Air Transport Pilots**
**Special Purpose Flying**
**Aviation Teachers**
**Aviation Safety Officers**
**Flight Simulator Operators**
**Flight Examiners**
**Flight Instructors**
**Airframe Mechanics**
**Powerplant Mechanics**
**Airframe and Powerplant Mechanics**
**Engineering Maintenance Directors**
**Avionics Technicians**
**Mechanics: Line Maintenance, Overhaul,**
**Powerplant**
**Dispatchers**

**Flight Service Specialists** work for the Federal Aviation Administration. They help pilots plan and carry out flights.

**Air Traffic Controllers** control and advise pilots in and around the airport. They inform pilots by radio about wind, weather and location of other airplanes.

**Ground Radio Operators** and **Teletypists** send messages that people on the ground want to get to planes in flight. They are the link between dispatchers, air traffic controllers, and pilots.

**Meteorologists** are the weather specialists. They assist the airlines and general aviation pilots by giving detailed and frequent information about weather.

**Air Transport Pilots** fly people and cargo at scheduled times over predetermined routes. They fly only between air carrier airports. They require three kinds of pilots, the captain, first officer and second officer. All three have specified duties during flight.

**Special Purpose Flying** involves the use of aircraft for many purposes such as:

**agriculture**
**forest fires**
**feeding livestock**
**serial photography**
**air ambulance**
**rescue missions**
**law enforcement**
**planting and fertilizing croups**
**cargo**
**chartering**
**sport flying**
**business**
**rural medicine**
**ferrying**

**Aviation Teachers** teach aviation and related subjects in over 200 junior colleges and universities and 2,000 high school.

**Aviation Safety Officers** conduct meetings for pilots on air and ground safety.

**Flight Simulator Operators** run machines which look like aircraft cockpits. These machines assist flight instructors in the training of their students.

**Flight Examiners** issue certificates to students who successfully pass written and flight examinations. They fly on the airlines to make certain that pilots observe the Federal Aviation Administration rules.

Flight Instructors teach people how to operate airplanes. They teach the basics of flying leading to the private pilot's license. They also help pilots earn advanced flight ratings.

## II. TECHNICAL *(CONTINUED)*

**Airframe Mechanics** are trained to test, repair, inspect and overhaul the frame of an airplane. The Federal Aviation Administration requires these mechanics to pass a special examination and receive a license.

**Powerplant Mechanics** are trained to test, repair, inspect and overhaul the engines of an airplane. The Federal Aviation Administration requires these mechanics to pass a special examination and receive a license.

**Airframe and Powerplant Mechanics** are known as A&P's and are required by the FAA to be licensed to work on both the airframe and powerplant of an airplane. These types of mechanics re very much in demand by the airlines and general aviation.

**Engineering Maintenance Directors** are persons skilled in the maintenance of the aircraft who have management abilities. They are in charge of mechanics and other maintenance people.

**Avionics Technicians** check, reset and rebuild the navigation and communication instruments of the airplane.

**Mechanics:** 1) **Line Maintenance mechanics** do minor inspections and repairs between flights.
2) Overhaul Mechanics do major inspection and repair work.

## III. MANUFACTURING

**Scientists and Engineers**
**Technicians**
**Skilled craftsmen**
**Semiskilled and unskilled workers**

**Scientists and Engineers** are involved in the research and development of everything from the outside structure of an airplane to the tools which are used to make different parts.

**Technicians** assist the scientists and engineers. They collect information, perform laboratory tests, conduct experiments and do technical writing, illustrating and drafting.

**Skilled Craftsmen** assemble everything from engines to entire sections of an airplane. Welders, tool-and-die makers, sheet-metal workers, and mechanics are other skilled aircraft plant workers.

**Semiskilled Workers** are similar in all industries and normally do assembly line work putting together parts of the aircraft.

## IV. SALES

**Ticket Agents**
**Sales Representatives**
**Concessions**
**Insurance Agents**

**Ticket Agents** make out tickets, check and weigh baggage and give out information.

**Sales Representatives** contact customers who may need an airline's services. Selling is a very broad category of activity. In general aviation it encompasses airplanes, parts and services.

**Concessions** on the airport include book stores, restaurants, newsstands, lounges, barber shops, beauty parlors, jewelry and others depending upon the size of the airport. They all sell goods or services to their customers.

**Insurance Agents** sell coverage for unplanned conditions, resulting in a loss, which may arise during a flight.

# ACTIVITY IIC.

## Local Airport Jobs

### INSTRUCTIONS

Match the responsibility for certain jobs, in the second column, with the correct occupation in the first column. Do this by placing the correct letter (A, B, C,...) on the blank in front of the number, in the first column.

### OCCUPATION

_____ 1. Pilot
_____ 2. Custodial service
_____ 3. Coffee shop cashier
_____ 4. Meteorologist
_____ 5. Security guard
_____ 6. Gift shop clerk
_____ 7. Line person
_____ 8. Ticket agent
_____ 9. Navigator
_____ 10. Flight attendant
_____ 11. Public address announcer
_____ 12. Air traffic controller
_____ 13. Flight insurance salespeople
_____ 14. Airport manager
_____ 15. Luggage unloader
_____ 16. Airport maintenance
_____ 17. Restroom attendant
_____ 18. Mechanic

### RESPONSIBILITIES

A. Is responsible for collecting the money for the item that is purchased at the coffee shop
B. Sells flight tickets and checks reservations
C. Keeps the building clean
D. Keeps the restrooms clean
E. Flies the airplane
F. Serves the passenger meals and needs
G. Charts the flight and keeps the plane on course
H. Sells the gifts that the shop has to sell
I. Gives weather report
J. Directs the traffic control (takeoff and landing)
K. Announces the arrival and departure of different flights and pages people in the airport
L. Checks people for items that may be dangerous
M. Sells accident insurance for flights and other forms of transportation
N. Fills plane with fuel
O. Repairs the airplane so that it works properly
P. Takes luggage and baggage on and off planes
Q. Keeps runways in good condition, removes snow, repairs buildings, mows grass, and keeps airport in proper condition
R. Is responsible for the overall operation of the airport

## ACTIVITY IIC.

### Local Airport Jobs—ANSWERS

**INSTRUCTIONS**

Match the responsibility for certain jobs, in the second column, with the correct occupation in the first column. Do this by placing the correct letter (A, B, C,...) on the blank in front of the number, in the first column.

**OCCUPATION**

E 1. Pilot
C 2. Custodial service
A 3. Coffee shop cashier
I 4. Meteorologist
L 5. Security guard
H 6. Gift shop clerk
N 7. Line person
B 8. Ticket agent
G 9. Navigator
F 10. Flight attendant
K 11. Public address announcer
J 12. Air traffic controller
M 13. Flight insurance salespeople
R 14. Airport manager
P 15. Luggage unloader
Q 16. Airport maintenance
D 17. Restroom attendant
O 18. Mechanic

**RESPONSIBILITIES**

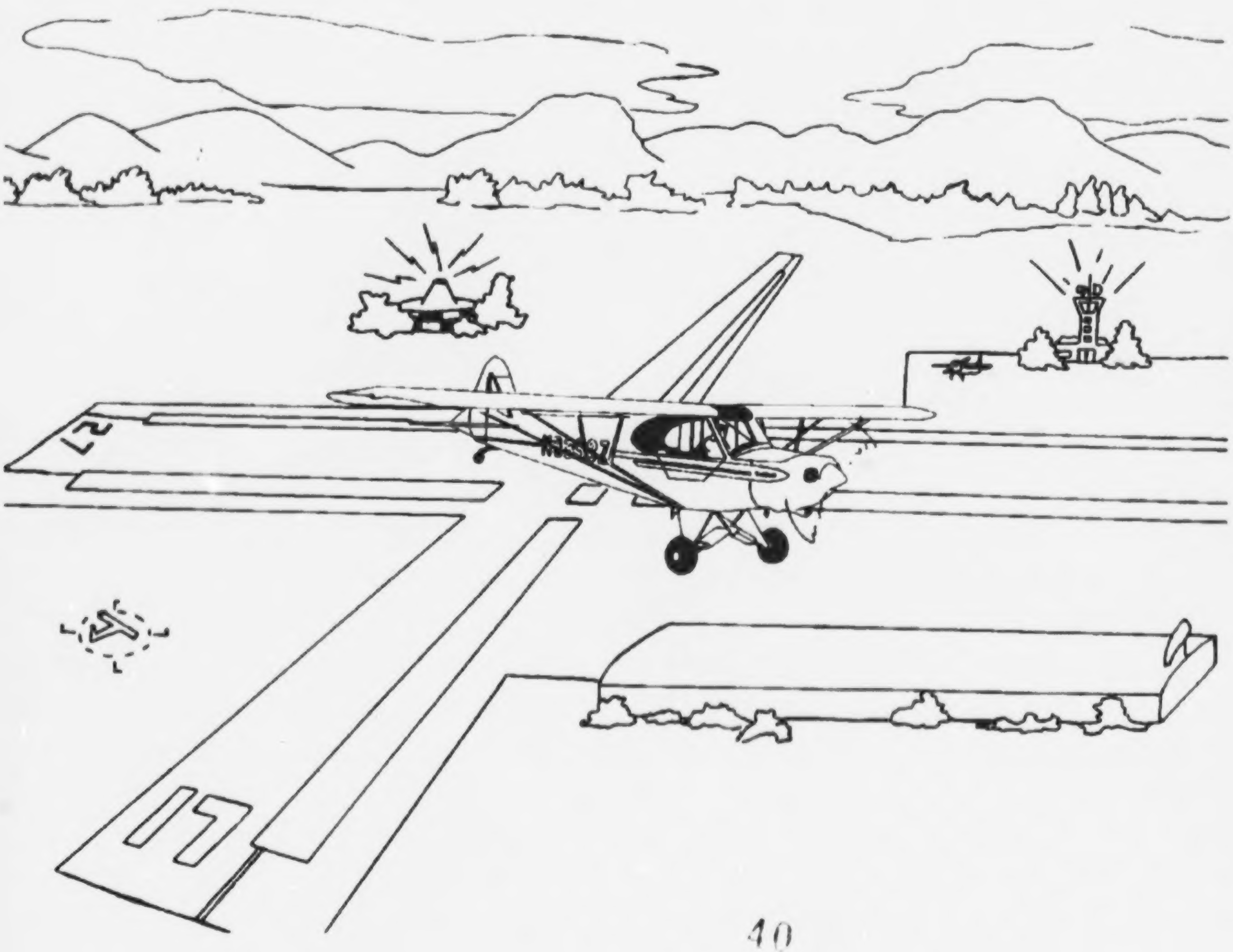
A. Is responsible for collecting the money for the item that is purchased at the coffee shop
B. Sells flight tickets and checks reservations
C. Keeps the building clean
D. Keeps the restrooms clean
E. Flies the airplane
F. Serves the passenger meals and needs
G. Charts the flight and keeps the plane on course
H. Sells the gifts that the shop has to sell
I. Gives weather report
J. Directs the traffic control (takeoff and landing)
K. Announces the arrival and departure of different flights and pages people in the airport
L. Checks people for items that may be dangerous
M. Sells accident insurance for flights and other forms of transportation
N. Fills plane with fuel
O. Repairs the airplane so that it works properly
P. Takes luggage and baggage on and off planes
Q. Keeps runways in good condition, removes snow, repairs buildings, mows grass, and keeps airport in proper condition
R. Is responsible for the overall operation of the airport

## *ACTIVITY IID.*

### Career Goals

Of the careers and jobs described in this section, which most appeal to each student? Have students complete the following statements:

- If I were to seek a career in aviation, I would most prefer ________ List occupation (s) ________.
- I have the following interests and qualities desired in this type of work: ____________________
  ________________________________________.
- I can obtain any of the following jobs in my own community: ____________________
  ________________________________________.



## *ACTIVITY IIE.*

## Using the Alaska Career Information System (AKCIS)

The Alaska Career Information System (AKCIS) is a comprehensive career guidance system developed by and for Alaskans. It provides information concerning occupational and educational opportunities inside and outside of Alaska.

Learning to use the system is easy and self explanatory. Most schools maintain current subscriptions and the system is available in hard copy or on computer. Many guidance counselors or librarians can guide students through the system with little effort. User staff training is available through regional workshops and technical assistance is provided upon request.

The AKCIS consists of two parts; (1) Exploration and, (2) Information.

### EXPLORATION

Quest, Link, School Sort, and Aid Sort are all part of the Exploration section. These tools help with career exploration and the educational planning process.

### INFORMATION

Occupation, Programs of Study, Alaska School, National School, Working for Yourself, Financial Aid, Job Search, Apprenticeship, Industry, Military and Personnel are all part of the Information section. The information in these fields helps students decide on future careers, required education, running a business, filling out financial aid for college or university, etc.

### INSTRUCTIONS

1. Have students choose an aviation related career and use the AKCIS to research educational requirements, personal choices, physical location of schools or training opportunities, etc.

2. Choose one college or university through the AKCIS. Write for financial aid applications, course outlines, etc. This may be an activity which will enhance a career day or job fair.

3. Develop a budget for training or education required for your chosen career field. Decide on following a complete education program or a varied and part time training or education program. Discuss the pros and cons of each choice.

4. Using the list of aerospace age careers and school subjects which follows, develop a list of courses recommended for the careers you are most interested to pursue.

## ACTIVITY IIE.

### Using the Alaska Career Information System (AKCIS)

| AEROSPACE AGE CAREERS AND SCHOOL SUBJECTS | Chemistry | Physics | Bookkeeping | Bus. Machines | Biology | English | Mathematics | Speech | Mechanics | Sheet Metal | Machine Shop | Welding | Radio | Electricity | Mech. Drawing | Woodworking | Journalism | Psychology | Typing | Shorthand | Photography | Nutrition |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aeronautical Engineer | ● | ● | | | | | ● | | ● | | | | | ● | ● | | | | | | | |
| Nuclear Engineer | ● | ● | | | | | ● | | | | | | | ● | ● | | | | | | | |
| Flight Test Mechanic | | ● | | | | | ● | | ● | | | | | ● | | | | | | | | |
| Design Draftsman | | | | | | | ● | | | | | | | | ● | | | | | | | |
| Instrument Mechanic | ● | ● | | | | | ● | | ● | | | | ● | ● | | | | | | | | |
| Airline Pilot | ● | ● | | | | | ● | | ● | | | | ● | ● | | | | | | | | |
| Flight Engineer | ● | ● | | | | | ● | | ● | | | | ● | ● | | | | | | | | |
| Airline Hostess | | | | | ● | ● | | ● | | | | | | | | | | ● | | | | ● |
| Ground Radio Operator | | ● | | | | ● | | ● | | | | | ● | ● | | | | | | | | |
| Airline Maintenance Inspector | ● | ● | | | | | ● | | ● | ● | ● | ● | ● | ● | | ● | | | | | | |
| Business Pilot | | ● | | | | | ● | | ● | | | ● | ● | ● | | | | | | | | |
| Meteorologist | ● | ● | | | | | ● | | | | | | ● | ● | | | | | | | | |
| Airframe Mechanic | | ● | | | | | ● | | ● | ● | ● | ● | | | | ● | | | | | | |
| Jet Engine Mechanic | | ● | | | | | ● | | ● | ● | ● | ● | | ● | | | | | | | | |
| Nuclear Weapons Mechanic | ● | ● | | | ● | | ● | | ● | ● | | | ● | ● | | | | | | | | |
| Air Electronics Officer | | ● | | | | | ● | | | | | | ● | ● | | | | | | | | |
| Aircraft Navigator | | | | | | | ● | | | | | | ● | ● | | | | | | | | |
| Military Pilot | ● | ● | | | | | ● | | ● | | | | ● | ● | | | | | | | | |
| Electronics Engineer | ● | ● | | | | | ● | | ● | | | | ● | ● | ● | | | | | | | |
| Airline Traffic Manager | | | | | | ● | ● | ● | | | | | ● | ● | | | | | | | | |
| Flight Surgeon | ● | ● | | | ● | | ● | | | | | | | | | | | ● | | | | ● |
| Scale Model Builder | | ● | | | | | ● | | ● | ● | ● | ● | | | ● | ● | | | | | | |
| Airline Accountant | | | ● | ● | | | ● | | | | | | | | | | | | | | | |
| Stenographer | | | | | | ● | | | | | | | | | | | | | ● | ● | | |
| Aerial Photographer | ● | ● | | | | | | | | | | | | | | | | | | | ● | |
| Public Relations Director | | | | | | ● | | ● | | | | | | | | | ● | ● | | | ● | |
| Physicist | ● | ● | | | | | ● | | ● | | | | | ● | | | | | | | | |
| Mathematician | | ● | | | | | ● | | | | | | | | | | | | | | | |
| Chemist | ● | ● | | | | | ● | | | | | | | | | | | | | | | |
| Metallurgist | ● | ● | | | | | ● | | | ● | | ● | | | | | | | | | | |
| Mechanical Engineer | ● | ● | | | | | ● | | ● | | | | | ● | ● | | | | | | | |
| Chemical Engineer | ● | ● | | | | | ● | | | | | | | ● | | | | | | | | |

Reprinted from Chap. XII Aerospace Age Careers of the CAP Aerospace Education Texts

# III. AVIATION SAFETY

## Val Aron

*FAA Operations Specialist*

## Patricia Mattison

*FAA Accident Prevention Program Manager*

# Val Aron

## OPERATIONS SPECIALIST

Photo by Linda Follett

Val Aron is known as a lady with goals that never allows pitfalls and setbacks to deter her from what she wants. Her name has become synonymous with aviation safety. Pilots throughout Alaska know her as a person who understands aviation and is determined to emphasize the importance of aviation safety every chance she gets.

Her introduction to aviation occurred when she was in seventh grade. She and her family owned a lake place in Northern Minnesota when some friends flew up to visit in a Cessna 170B. In exchange for some water skiing fun, the friends provided Val with her first experience at flying in an airplane. The twelve-year-old girl described her adventure as being incredible as she looked at the lake for the first time from a bird's eye view. At that time, however, flying was thought of as a rich man's sport that required a great deal of money. For that reason, Val filed away any notion she might have had of becoming a pilot. Later as she was attending St. Cloud State University she met a young man who was working on his commercial flying license under the GI Bill. He took her flying a couple of times which just further reinforced her idea that flying would be a fun thing to do someday. When she later moved to Washington, D.C., her path crossed another budding aviator. Days spent flying with this new friend allowed her the opportunity to handle the controls. Although she displayed a natural aptitude in knowing what to do in the cockpit, flying still seemed to be a sport for the rich. She thought of herself as a fledgling instructor at the University of Maryland teaching traffic safety who should not be presumptuous enough to think she could take flying lessons.

As time passed Val went on to graduate school to earn a Masters degree in general transportation safety where she acquired all the general preparation necessary in the field of safety. When OSHA was established, Val was in the position of having the needed skills and abilities. She was contemplating the benefits of a doctorate degree when suddenly the aviation bug hit its mark. Val felt the call of the skies reaching out to her much more than a Ph.D. program.

In January 1977, Val began her flying lessons and thus initiated a successful career in aviation. A year later, she packed all her belongings in her car, along with her private pilot certificate, and with no money in her pocket, headed for Spartan School of Aeronautics in Oklahoma. Before leaving the east coast, she attempted to join the military as a pilot, but each branch rejected her because she was too old at the ripe age of 26. Upon reaching Oklahoma, she proceeded to get student loans for flight school until she could earn enough money teaching flight instruction to pay for her classes. With her commercial/instrument/certified flight instructor/multi-engine certificates in hand, she packed her car once again and headed for Mesa, Arizona, where she landed a job with Desert Air as a pilot doing flight instruction and charter flying. When the company went bankrupt Val returned to Spartan. Her path this time crossed with a man she had met once before when he was a student in her instrument ground schools. She and Paul were married in 1980. With his background as a jet-engine mechanic plus his and Val's flying and teaching skills they jointly pooled their resources, packed the old Toyota again, and headed north to Alaska. Since Paul had been stationed in the military in Alaska prior to moving to Oklahoma he still had friends in "The Last Frontier" who helped find jobs for these two new cheechakos.

Paul and Val provided flight instruction and charters for flightseeing trips for Langdon Aviation for six months. Finally in 1980 Val and Paul began their own business where they provided flight instruction and ground school in a Citabra and a Cessna 150. In 1981 Paul was killed while flying for Spernak Airways in what will forever be an unexplained accident. He and three passengers disappeared over Cook Inlet and were never found. All the wrong things were in place for an accident to happen—a last minute call flight, someone needing to get somewhere right away, the pilot had been working hard all day and was fatigued, there was ice fog earlier in the day, etc. This unexpected and sudden setback in Val's life did not diminish her involvement with aviation. In fact, it spurred her on to dedicate more of her time to the subject she studied back in her college days - transportation safety. The accident prevention program for aviation was now more dear to her heart than ever before and she maintained an untiring work schedule throughout the years ahead.

Being a person driven by her goals Val earned her airline transport pilot certificate in 1982 while teaching at Anchorage Community College and the Computer Learning Center at Alaska Pacific University. In 1983 she reached another goal to fly for a commercial carrier. She was hired by Alaska Aeronautical Industry (AAI) to fly twin Otters and Bandits. Before long, Val attained the rank of Captain with AAI and was one of only three women ever hired, flying for that company earning $900 a month salary. During all that time she augmented her salary by continuing her business and provided flight instruction in addition to commercial flying. She left AAI to work for Valdez Airlines in July until the company went bankrupt in September of 1984. Val again found herself looking for another employer.

In March, 1985, Val accepted a job with Air Pac to fly as first officer along with a number of ex-Wien pilots flying four-engine jets and doing heavy flying and consultant work. When that company went bankrupt also, Val fell back on her flight instruction business along with teaching at the university. Her jobs kept food on the table and a roof over her head.

In June 1986 Val joined the Federal Aviation Administration as a leader in the Accident Prevention Program and still remains in the Flight Standards division to this day. As an Operations Specialist, Val reviews individual enforcement cases to determine if the case merits further action. She also assists in writing and editing the Flight Inspector's Handbook used by FAA Inspectors in the field and responds to the Alaska Complaint Hotline referred to the Flight Standards Division.

In May, 1991, Val tackled a new adventure. While watching the start of the Iditarod she became infatuated with the sport and wanted to someday run that race with her own team. She apprenticed with a friend of a friend and then decided to start her own kennel with the ultimate goal of running the Iditarod. After ten years of teaching at least two nights a week at the university, Val gave up her teaching position and decided to dedicate her time and efforts to her dogs. Once she learned the basic ropes she borrowed enough dogs to run the Knik 200 race, a qualifier for the Iditarod. In

1993 Val entered the Iditarod and covered 200 miles before she made the difficult decision to scratch from the race. Interestingly enough, Val relied upon the safety training learned over the years to make the decision to turn around and go home. With sick dogs and a vicious hand wound, she questioned herself out loud on the trail. "Would she continue a flight with contaminated fuel and non- working instruments?" When the answer to those questions was a definite NO, she knew it was time to turn around. Val currently maintains 24 dogs in her kennel and is looking forward to future Iditarods.

Val encourages youngsters and oldsters alike to get rid of any hazardous attitudes that can lead to trouble. It usually does not pay to be macho when you are in a potentially dangerous situation that requires only wisdom and common sense. She has had a positive affect on many of Alaska's aviators through the FAA Safety program and has earned herself a place in the hearts of many Alaskans - both human and canine.

# Patricia Mattison

## FAA ACCIDENT PREVENTION PROGRAM MANAGER

Photo by Mary Lou Dordan

"Flying is a wonderful expression of yourself." These are the words that Patti Mattison lives by every day of her life as she continues to immerse herself in an aviation career with the Federal Aviation Administration (FAA). She is a firm believer that the way a person thinks and acts in the cockpit of an airplane says a lot about the ethical, moral, and ideological make-up of that person. "If you conduct yourself in a courteous and professional manner in the cockpit of an airplane; rather than taking a *ME FIRST* attitude, then in all probability you are that same kind of person on the ground. Usually it is the pilot that pushes to be first in line to land that is the same person who cuts in line in the grocery store and fights for the closest parking place."

Patti was born in Oakland, California in 1939 at the beginning of the World War II era. At the end of the war an uncle of Patti's who had flown for the Royal Canadian Air Force, offered to take her for an airplane ride. That was all it took to convince Patti that airplanes were going to be an important part of her future. As the little girl sitting on her uncle's lap to see over the yoke, she was awestruck with the view of a whole new world as they flew with the swiftness and agility of a bird over the Burbank and Van Nuys terrain. She had listened to her father talk about his activities as a bombadier and navigator in the Army Air Corps, but until then she could only dream of what it felt like to soar above the earth among the clouds.

Later, when Patti was six years old, she took advantage of United Airlines offer to let children visit the cockpit for 5-10 minutes at a time during the flights in their DC-3s and DC-7s. This experience just further reinforced the notion that she wanted to fly airplanes. Her school friends frequently heard Patti tell fanciful tales of new airplanes and learning to fly. She often told of her mother's plan to buy her an airplane so she could fly. In reality, everyone in Patti's life vehemently insisted that flying was not a respectable profession for a young girl. Girls were supposed to be librarians, schoolteachers, or nurses—NOT pilots. Patti's mother was determined to have her daughter pursue a goal that was acceptable to society so she enrolled the young girl in dance school and music classes. By the time she was 16 years old she was a student dance instructor. Excelling in dance instruction she had her own dance studio at the age of nineteen. All the while she continued to dream of flying.

Finally, in her early 20's, Patti developed the courage to defy everyone that said she could not learn to fly. Even without the support of her family or husband, Patti enrolled in Aeronautics 101 at Southwestern College in San Diego. Her husband, who at that time was with Marine Corps Air Wing, refused to endorse Patti's desire to fly. While teaching ballet six days a week at local colleges, she attended aeronautics classes! At last! The dream was alive and headed for distant horizons.

Soon after completing ground classes, Patti located a flight instructor at the Cessna Pilot School. He was an ex-fighter pilot and turned out to be the perfect teacher for the 5'1" student who wanted to soar with the birds. Patti's husband continued to profess that women had no right to be pilots, and refused to permit any of their combined incomes to be used for flight lessons. But Patti's will to fly was very strong. She found a sideline job of babysitting three difficult children daily to earn $80.00 a month, just enough moonlight money to pay for flying lessons. Despite opposition from home, once a week Patti paid $15.00 for an instructor and airplane to pursue her goal.

By shear force and determination, Patti continued her instruction and ultimately earned her commercial pilot's license. She and her husband opened a flight school in the Grand Canyon. She hired three instructors and maintained three planes for the next eighteen months. As marriage and business deteriorated Patti sought new paths to follow. In 1975, she decided to end the business and her marriage. With the responsibility for two young daughters and a son, Patti sought refuge with friends in the Grand Canyon area.

As fate would have it, Patti crossed paths with neighbor from her past who was working as a resident jeweler at a tourist shop in the Grand Canyon. They embarked upon a relationship that culminated in marriage. Looking back on her first disastrous marriage Patti remarks, " it just keeps getting better all the time". Patti, her new and supportive husband Charlie, and their four children then moved to San Diego, California, where they combined skills to support their growing family: she as a dance instructor and he as a professional jeweler. After two and a half years of marriage, they came to the realization that Patti's skills as a pilot were being wasted. With the financial help of their parents plus their own income, Patti earned her certified flight instructor's certificate in 1980 and began teaching at the North Island Navy Flying Club in Coronado, California. Thus began a successful career in flight instruction that included students who went on to the Top Gun Naval Pilot School, a Pentagon coordinator for military air shows, and numerous airline and general aviation pilots.

The next three years found Patti as chief flight instructor at Brown Field in San Diego and Fullerton, California, until she finally began her own flight school in Corona called Skyhawk Aviation. For five and a half years she flew her favorite airplane (a Cessna-172RG), around the Valley area transporting people who had missed airline connections, flying as corporate pilot for a local corporation, and teaching new students how to fly. There always seemed to be a waiting list of students to take lessons from the spunky female pilot. Many times students would seek Patti out when they had problems with other flight instructors. They had heard of her reputation as a safe, thorough, and patient teacher.

As time passed, the general aviation business started a downward spiral as liability insurance premiums skyrocketed for manufacturers and small business owners. The number of small airplanes being built was drastically reduced making it impossible for Patti to acquire new aircraft for instruction. The sad demise of general aviation was looming on the horizon.

In 1989, Patti decided to expand her aviation skills and began a career with the Federal Aviation Administration (FAA) in San Diego as an aviation safety inspector. For Patti the most important factor in flying is safety, and in her ever growing desire to encourage people to "fly smart." Patti became a FAA Accident Prevention Program manager. The attraction of Alaska as a flying state tempted Patti to leave the hustle, bustle, and smog of the big city. When a job opening became available, Patti jumped at the chance and moved to Juneau, Alaska.

Patti believes moving to Alaska was one of the best things that ever happened to her. She now spends her time working at machete speed as she conducts aviation safety seminars throughout the state, works with aviation industry groups to promote safe flying, dedicates a great deal of time towards aviation education activities with school children, and even teaches some classical ballet lessons on the side. Patti is a strong advocate for education and encourages youngsters and oldsters alike to "stretch themselves to learn as much as they possible can." She particularly counsels students to take courses in math, science and psychology. Communication skills is also an area highly emphasized. According to Patti, "education is the key to open many doors in this world, and aviation is a path that can lead anyone to a world of fun and adventure not to mention a successful career."

# ACTIVITY IIIA.

## Alaska Aviation Fact Sheet

The Federal Aviation Administration (FAA) provides information on all aviation and aviation related items courtesy of their research department. Study the September 1993 Alaska Aviation Fact Sheet which follows and look for math related problems.

### ACTIVITIES:

1. Write at least five word problems for a partner to solve. Each problem should include some fact derived from the Alaska Aviation Fact Sheet. Complete the assignment by writing a key for each word problem.

2. Choose one topic (Seaplanes, Airport Improvement, etc.) and complete an in-depth research report. This may include bulletin board displays, overhead slides, computer graphics of maps, diagrams, pictures, etc.

3. Research FAA funding. Make a class presentation on the FAA, political lobby, state projects, and funding base. The FAA Public Affairs Officer can assist with information concerning program development, funding, political lobby, etc. You may wish to request a speaker from the FAA to discuss topics of interest to the class.

4. Develop a new project for the FAA to fund. Design your own airport and surrounding facilities. Make a budget for development, design an environmental study, simulate the community complete with a variety of inhabitants and a tax base. Divide the class into contrasting groups and prepare for a hearing. Design the hearing to argue the pros and cons of project development. Encourage students to use the Alaska Aviation Fact Sheet to support their points of view.

# ACTIVITY IIIA.

## Alaska Aviation Fact Sheet (CONTINUED)

### FAA ALASKAN REGION FACTS:

- 591,004 sq. miles
- 8 towers
- 1 center
- 3 sectors
- 3 flight standards offices
- 3 automated flight service stations

### PILOTS & AIRCRAFT:

- Alaska has about six times as many pilots per capita and 16 times as many aircraft per capita as the rest of the United States.
- Alaska has 9,566 pilots and 9,408 aircraft (December 1992 statistics). This is about one pilot for every 58 Alaskans and approximately one aircraft for every 59 Alaskans.

### FLIGHT HOURS:

- General aviation hours flown in Alaska annually are about 995,000, which is 3% of the U.S. total general aviation hours flown. Alaska averages 105 hours flown per pilot, while the U.S. as a whole averages 43 hours per pilot.

### AIRPORTS:

- Alaska ranks sixth in the number of airports (583 including heliports and seaplane bases). That is 3.5% of the total number of airports in the U.S. Texas is first with 1,662; Illinois is second with 924; California is third with 922; Pennsylvania is fourth with 752; and Florida is fifth with 698.

### AIR COMMERCE:

- Air commerce in Alaska carries the equivalent of four times the state's population each year, compared to about 1.7 times the U.S. population carried by air commerce in the other states.

### SEAPLANES:

- Lake Hood in Anchorage is the world's largest and busiest seaplane base. It accommodates more than 800 takeoffs and landings on a peak summer day.
- Alaska has the most seaplane bases in the country—102. This is 25% of the U.S. total. Minnesota ranks second with 66.

### ANCHORAGE INTERNATIONAL AIRPORT & MERRILL FIELD:

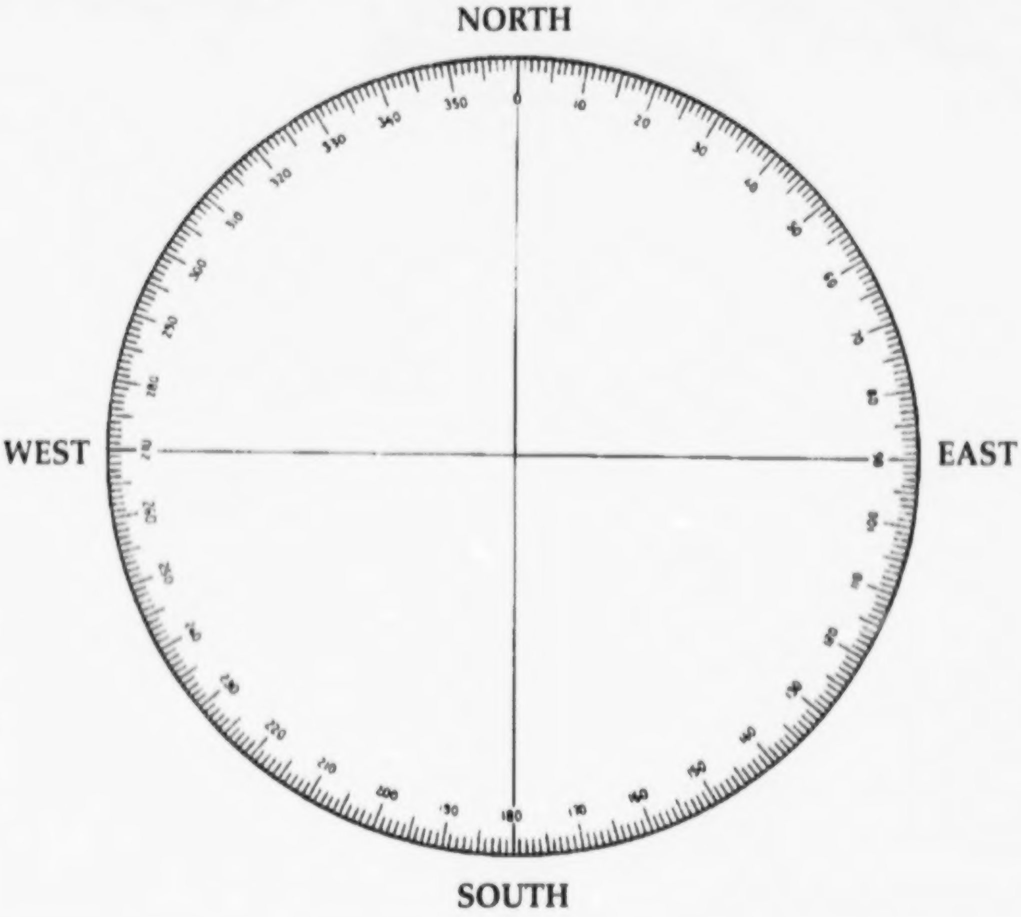
- Anchorage International Airport had 236,719 flight operations in fiscal year 1992, making it the 57th busiest airport in the country.
- Merrill Field in Anchorage was 64th busiest in the nation with 225,713 flight operations during the year. On a peak day last April, Merrill supported 1,379 takeoffs and landings.

### AIRPORT IMPROVEMENT:

- Since it's inception in 1946 through May 4, 1993, the airport improvement program provided $686,876,000 for airport development and planning in Alaska. These federal funds were provided for 708 projects at 368 locations within the state. In fiscal year 1993, it is estimated that there will be 53 projects added costing between $62 million and $65 million. The current federal funds participation rate for eligible projects in Alaska is 93.7%.

# ACTIVITY IIIB.

## Compass Navigation



A compass has the shape of a circle. It is a device used for many purposes, but we know it primarily for its use in navigation. A ship at sea, or an airplane in the air, needs a way to determine direction. A magnetic compass is designed in such a way that the needle points to the North.

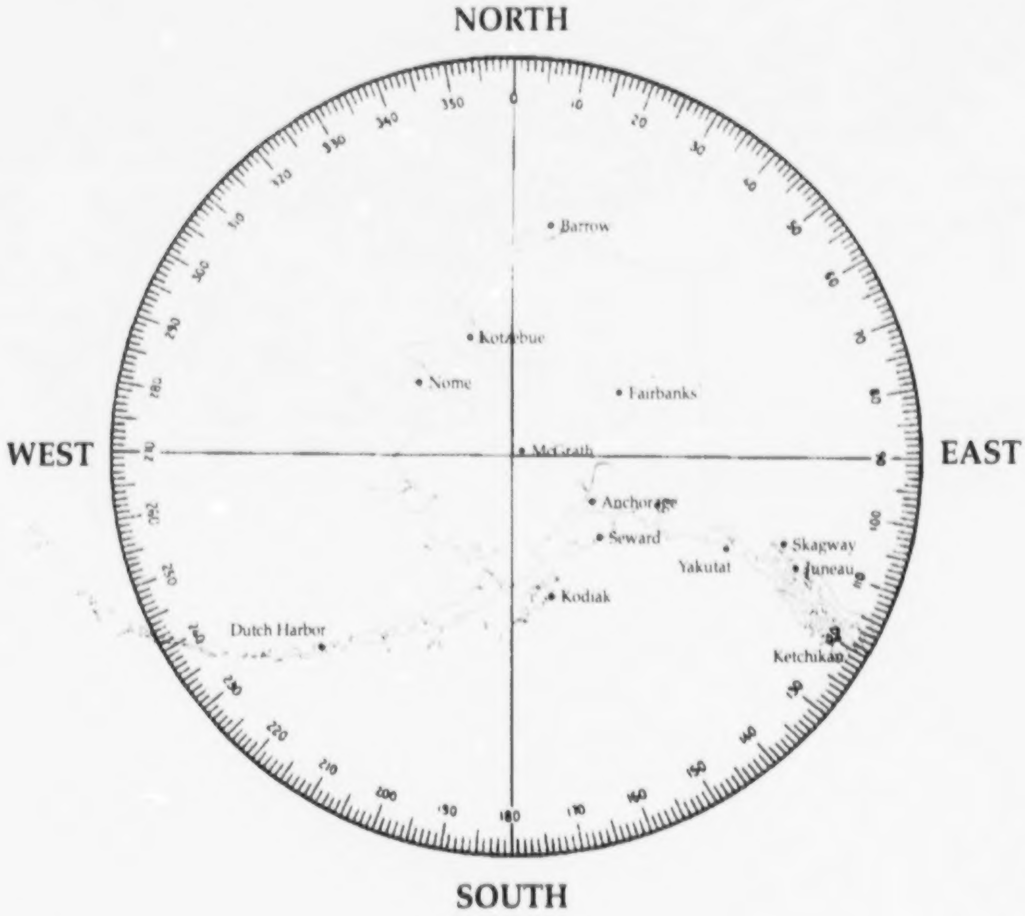
## HISTORY OF COMPASS MEASUREMENT

In order for a compass to be a useful instrument, it must measure any direction. The ancient Babylonians used to measure the movement of the earth in relation to certain stars. It was thought that it took 360 days for the earth to make one complete revolution around the sun until the star was visible in the same position again. The circle was divided into 360 equal parts by the Babylonians and each part was called a degree. Consequently, the modern compass has 360 degrees.

**Teachers can use this page to make an overhead for navigation instruction.**

## ACTIVITY IIIB.

### Compass Navigation (CONTINUED)


NORTH
0
10
20
30
350
340
330
320
Barrow
Kotzebue
Nome
Fairbanks
WEST
McGrath
EAST
Anchorage
Seward
Yakutat
Skagway
Juneau
Kodiak
Dutch Harbor
Ketchikan
230
220
210
200
190
180
170
160
150
140
SOUTH

## ACTIVITIES

1. If you took a trip to Anchorage from McGrath, which direction would you fly? ____________
   Draw your course on the compass.
2. The direction from Kodiak to McGrath is ____________.
3. If you took a trip along the 327 degree radial from McGrath, what part of Alaska would you be seeing?
4. To get to Skagway from McGrath, what direction would you fly? ____________.
5. Plot your course to Dutch Harbor from Juneau on the compass.
   Which direction have you chosen to fly? ____________.
6. If you found yourself in Ketchikan and you wanted to return to Nome via McGrath, which directions would you travel? ________ ________. Draw it on the compass.

# ACTIVITY IIIC.

## The Phonetic Alphabet

An important tool in transport communication, while in the air, or on the ground, is the phonetic alphabet. It is used by pilots and others in aviation to avoid mis-communication. Some voices are hard to understand over a radio and many letters in the alphabet may be misunderstood. Letters such as "b" and "d" may often sound the same but the words "bravo" and "delta" do not. All letters in the alphabet have a distinctive word beginning with that particular letter.

All planes must have identification numbers called "N numbers". The N at the beginning signifies the country in which the plane is registered. All pilots preface their communication with a call sign or N number of the plane they are flying. For example a pilot requesting landing instructions will say, "Elmendorf Tower, N 0551 whiskey alpha" and wait for a response. The tower will respond with, "N 0551 whiskey alpha, Elmendorf Tower, go ahead". Then the pilot would request landing instructions.

When the tower contacts planes in route the pilot always answers the call with the N number before responding. For example, the tower would say, "N 0551 whiskey alpha, Elmendorf Tower." The pilot would respond with, "N 0551 whiskey alpha, go ahead." Then the tower would communicate the message.

## INSTRUCTIONS

Using the phonetic alphabet chart, make your own identification number. Start with N for the United States then write the month number and date of your birthday (put a zero in front of month numbers that only have one digit). Then add your first and last initial using the phonetic alphabet.

***Example:***

**Orville Wright's birthday is August 19th. His N number would be N 0819 oscar whiskey.**

1. Practice saying your identification number until your response is smooth and articulate. Now you are ready for the action phase.
2. Students and teacher construct a name plaque by folding an 8.5 by 11 inch sheet of paper into four strips and writing the n number on one strip. Fold and tape the name plaque so it sits in front of each person facing the classroom.
3. Choose a subject or period that requires discussion and use proper radio etiquette and n number identification during any spoken communication.

### PHONETIC ALPHABET

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | Alfa | H | Hotel | O | Oscar | V | Victor | 1 | Wun | 7 | Sev-en |
| B | Bravo | I | India | P | Papa | W | Whiskey | 2 | Too | 8 | Ait |
| C | Charlie | J | Juliett | Q | Quebec | X | Xray | 3 | tree | 9 | Nin-er |
| D | Delta | K | Kilo | R | Romeo | Y | Yankee | 4 | Fow-er | 0 | Zero |
| E | Echo | L | Lima | S | Sierra | Z | Zulu | 5 | Fife | | |
| F | Foxtrot | M | Mike | T | Tango | | | 6 | Six | | |
| G | Golf | N | November | U | Uniform | | | | | | |

# ACTIVITY IIID.

## Decoding Weather Observations

Knowledge of weather is an integral part of safe flying. Although the primary "killer" of pilots is human error, weather plays a very important part in planning, executing, and surviving a flight.

## INSTRUCTIONS

Look at the following code key to decode the weather observations. Pilots must learn to read and decipher these observation reports in order to fly in safe weather. Though they seem complicated, with enough experience anyone can usually read the reports.

DCA SP 0056 -X M25OVC 7/BL-FK 046/66/65/2723/967 F6 VSBY S1/4 PK WND 2736/06

| | |
|---|---|
| DCA | Station Identification using FAA identifiers. |
| SP | Type of report. |
| -XM250VC | Sky and ceiling. |
| 7/B | Prevailing visibility. |
| L-FK | Weather and obstructions to vision. |
| 046 | Sea level pressure. |
| 66 | Temperature. |
| 65 | Dew point. |
| 2723 | Wind. |
| 967 | Altimeter setting. |
| F6 VSBY S 1/4 | Miscellaneous. |
| PK WND 2736/06 | Peak wind. |

## TABLE 1

### WEATHER SYMBOLS

| | |
|---|---|
| T | Thunderstorms |
| T+ | Severe Thunderstorms |
| A | Hail |
| IC | Ice Crystals |
| IP | Ice Pellets (Showers) |
| L | Drizzle |
| R | Rain |
| RW | Rain Showers |
| S | Snow |
| SG | Snow Grains |
| SP | Snow Pellets |
| SW | Snow Showers |
| ZL | Freezing Drizzle |
| ZR | Freezing Rain |

### OBSTRUCTION TO VISION

| | |
|---|---|
| BD | Blowing Dust |
| BN | Blowing Sand |
| BS | Blowing Snow |
| BY | Blowing Spray |
| K | Smoke |
| H | Haze |
| D | Dust |
| F | Fog |
| GF | Ground Fog |
| IF | Ice Fog |

### WEATHER INTENSITY SYMBOLS

| | |
|---|---|
| + | Heavy |
| - | Light |

Absence of symbol indicates moderate except for T, A, IC.

# ACTIVITY IIID.

## Decoding Weather Observations (CONTINUED)

## TABLE II

### SKY COVER SYMBOLS

| | |
|---|---|
| -X | Partially obscured sky (1.0 to .09 sky hidden by surface-based obscuration) |
| X | Obscuration (1.0 sky hidden by surface-based obscuration) |
| CLR | Clear (0.0 sky cover) |
| SCT | Scattered (0.1 to 0.5 sky cover) |
| BKN | Broken (0.6 to 0.9) |
| OVC | Overcast (1.0 sky cover) |

A minus sign (-) preceding a SCT, BKN, or OVC indicates that layer is thin.

## TABLE III

### CEILING DESIGNATORS

| | |
|---|---|
| M | Measured |
| W | Indefinite |
| E | Estimated |

### INSTRUCTIONS

1. Make up several observation reports or contact your local flight service station for copies of an observation report. Have students use the guide above to decipher the weather report for your local airport.

2. Have students learn to make and use the observation reports to quiz each other on weather reports.

3. Call the Automated Flight Service Station (800-922-7433 advertised as 800-WX-Brief) to listen to current weather reports. This takes some practice as the briefs go very fast! Try to code one of these reports using the observation report keys.

## *ACTIVITY IIIE.*

### Flight Planning

### INSTRUCTIONS

1. Locate a pilot or flight instructor. Ask her or him for a copy of the preflight checklist that every pilot is required to use. Talk about the importance of each item on that list. What could happen if a pilot overlooked one of these items?

2. Why are flight plans so important to pilots? What information is reported when filing a flight plan? What happens when a pilot forgets to close his or her flight plan upon reaching the destination?

# IV. AVIATION CURRICULUM SUPPLEMENTS FOR TEACHERS

# THE GENERAL AVIATION STORY...

## "GENERAL AVIATION...AIR TRANSPORTATION FOR EVERYONE... BENEFITING EVERY ONE OF US"

REPRINTED WITH PERMISSION OF
GENERAL AVIATION MANUFACTURER'S ASSOCIATION

### INTRODUCTION

General Aviation...What is it? What does it do? Why is it a dynamically expanding industry touching every sector of American life?

Years ago, general aviation - in truth, all aviation - was a conglomeration of barn-storming flights, stunt flying, occasional group pleasure trips, and in some cases, only for the adventurous of the time. Today, still, some people continue to see general aviation as it was during the early days.

But, general aviation has come a long way since Kitty Hawk, and now represents a very significant industry in the United States. It is an industry that touches every aspect of our lives, our economy, our growth and our future.

General aviation is now one of the world's largest passenger carriers, boarding 100 million people annually! It represents thousands of jobs, millions of dollars in revenues, and the growth of thousands of cities, businesses, services and manufacturing facilities throughout the United States.

### GENERAL AVIATION AND THE NATIONAL AIRWAYS

A lot of things happened when the Wright Brothers took off that windy afternoon at Kitty Hawk. It was the birth of a new industry, a new way of life for America and the world. It was the beginning of an industry that would spawn other industry...and develop towns, jobs, and communities. It was the beginning of Aviation.

Aviation grew rapidly, and in many directions. In 1926, the United States Government recognized the future potential of aviation, and took steps to regulate the use of the airways to best suit the needs of the nation and its people. The Air Commerce Act became law, and the Federal Government assumed full control and responsibility for operating and maintaining the national airways system. The Government enacted this law on the basis of public necessity - for the good of the entire nation. It was similar to what the Government has done to help develop other forms of transportation in the United States.

Since then the aviation industry - the military, the commercial airlines and general aviation - has grown significantly. In particular, general aviation has developed to the point where it is now the largest, and in many ways, the most significant segment of this country's air transportation system.

As major partners in this system, general aviation and the airlines together make up the nation's balanced air transportation network - the safest, most responsive and most efficient in the world. It is a system which provides safe, dependable air travel to everyone, everywhere, and at all times.

Today, air transportation is the prime mover of commerce and social change. It contributes immensely to the growth and well-being of the entire nation through a network of some 14,000 airports.

The airlines serve approximately 450 of these airports, and provide more than 220 million passengers a year with efficient, dependable service.

General aviation also serves these 450 airports. However, there are an additional 13,550 airports in this country that are served exclusively by general aviation! These general aviation airports provide thousands of American towns and communities with their only link to our vital air transportation system.

Twenty-five of the 450 airports served by the airlines generate nearly 70% of their total passenger traffic; and 150 of these airports board 96% of the traffic. In other words, more than 13,200 airports, and the communities they serve rely at least partially, and in most cases, entirely, on general aviation for air transportation.

There is no doubt that general aviation is a full-fledged partner in our national air transportation system - both general aviation and the airlines share our vital national airways...and share them to the benefit of all.

## GENERAL AVIATION... WHAT IT MEANS AND WHAT IT DOES

Within the diverse and varied categories of general aviation, there are many reasons why people fly. For example, 72% of all general aviation operations are for business or commercial purposes. Approximately 23% is for personal transportation and proficiency flying. And 5% is for sport - those who fly solely to experience the fun, the freedom of flight.

In some ways, general aviation reaches every segment of American life, and touches people in many different ways.

For the farmer, general aviation means increased crop yield, more efficient fertilizing, and the reduction of crop disease. To the businessman, it means an efficient, productive means of transportation. To those in small towns, it not only helps bring the mail but it also means new job opportunities and new dollars brought in by industry which utilizes community airports.

In other areas, general aviation fights fires, carries patients, manages cattle, performs aerial mapping and pipeline patrol, and transports Americans to more than 14,000 airports across the country. In fact, one out of every three inter-city air passengers travels on a general aviation aircraft - a total of 100 million a year.

And what about the aircraft that are used in general aviation?

Generally, there really is not much difference between the instrumentation and controls aboard a general aviation business airplane and those of an airliner. There is not much difference, either, in the piloting skills required or in the proficiency needed for safe, responsible flight.

General aviation pilots who fly into large metropolitan airports have essentially the same technological aids and skills available to them as do airline pilots. In fact, each general aviation airplane is specifically equipped and instrumented for the type of airspace and weather it flies in, and the type of airport it uses.

As an ecological sidenote, general aviation is also a very clean form of transportation, because aviation safety requires an engine that is well maintained and periodically inspected by qualified examiners. In addition, 90% of the fuel used in general aviation is burned at levels that will not affect the air we breathe.

## THE AIRPORT...MEETING THE NEEDS OF A CHANGING INDUSTRIAL SOCIETY

Thirty years ago, more than half of America's manufacturing plants were located in cities with populations of at least 100,000. By 1956, however, one-third of all new factories were going up in smaller cities or towns. And today industrial decentralization continues away from major population centers to smaller communities that have something in common...a general aviation airport.

From the strictly business viewpoint of an expanding industrial firm, these communities and their airports mean proximity to raw materials, lower land and capital investments costs, a less competitive labor force, and better living conditions for their employees. It also means that accessibility, both in and out, is assured by their airport.

And to run a successful industrial operation in areas that used to be called "remote," it is necessary to have a community airport. Surveys of major U.S. corporations have shown that most of them are reluctant to locate plants and offices in an area that lacks adequate airport facilities.

Time and again it has been proven that a town without an adequate airport stands a good change of becoming a ghost town. At best, it certainly will not do much growing. On the other hand, every time general aviation brings in new industry, it simultaneously creates new benefits for the community. According to recent study by the Chamber of Commerce of the United States, every 100 new industrial jobs creates an economic fallout - a million more dollars in personal income...more than a half million dollars in additional retail sales...an additional retail store, and an increase of 68 non-industrial jobs.

The truth is, the very map of U.S. industrialization is changing perceptibly, and general aviation is one of the reasons why.

## THE USES OF GENERAL AVIATION

General aviation is a diverse industry. It consists of six basic categories: business flying; air taxi, rental and commuter operations; special purpose flying; personal transportation; sport flying, and instructional flying.

## BUSINESS FLYING

Business flying represents the largest category of general aviation. In addition to approximately 100,000 personally owned aircraft, many of which are used for business purposes, there are over 45,000 business-owned aircraft that are used solely for this purpose. These thousands of planes make over six million flights each year - almost as many as all the airlines put together.

Why are business aircraft employed so extensively? And why are the number of business aircraft and the number of flights constantly growing? The answer is simple - good economics and high efficiency. Companies use general aviation aircraft to save time, transporting their people and their products and, equally important, supplies and parts to keep their production lines moving.

Nearly one-third of all business flights into major metropolitan airports each year connect with a scheduled airline flight. The vast majority of general aviation business flight, however, are between communities that lack adequate airline service. Business flying in general aviation has the flexibility to be at the right place at the right time, and the exceptional utility to perform where others can't.

For instance, to fly from Erie, Pennsylvania to Winston-Salem, North Carolina, using only scheduled airlines, would take about six hours with one connection. This same trip in a typical business aircraft would take two hours, and would be a direct, non-stop flight. This is typical of the economy and utility of business flying; and it's indicative of why many business flights would be difficult, if not impossible, without general aviation.

There is also a direct correlation between the use of a business aircraft and the financial well-being of the firms that operate them. In a recent survey of the top 1,000 industrial companies, conducted by Aviation Data Service, Inc., it would found that over half, or 502 industrial firms, operated their own aircraft (1,648). However, these 502 companies grossed nearly 83% of the total sales for the entire group...and earned 86% of the net income.

These companies have learned the value of owning their own airplanes. While business planes once were used only for transportation of top company officials, they now transport a wide range of employees and customers...managers, engineers, salesmen, accountants and many other specialists who are constantly on the move, managing the diverse, widespread and complex organizations and projects of modern business.

There is also another aspect to business flying. Only 8% of the entire business fleet is turboprop or jet aircraft. The remaining 92% are piston engine aircraft, operated mainly by smaller companies around the country to increase their productivity, and their power to compete in the marketplace.

The effective use of a business plane, as a key tool in a firm's operations, is really what business flying is all about. Through utilization of the right general aviation airplane for the right purpose, and by recognizing its advantages in speed, mobility, flexibility, convenience and safety, more and more companies are broadening their scope of operations in a more economical, efficient and profitable manner.

There is no doubt that the business aircraft has become an integral part of America's economic structure; and, it is contributing heavily to the dramatic changes in that structure. Literally, the factory is now going where the airplane can go.

## AIR TAXI, RENTAL AND COMMUTER OPERATIONS

Each year, more and more people save time and money by chartering or renting a general aviation airplane. Last year alone, some 2,500 air taxi companies flew ten million passengers where they wanted, when they wanted, to any of the nation's 14,000 airports. In addition, thousands of pilots each year rent airplanes to carry them, and their passengers, to virtually any destination, taking advantage in another way of the "anytime-anywhere" flexibility of general aviation.

The scheduled commuter caries are one of the fastest growing segments of general aviation. They have been moving steadily into the small city markets that have proved unprofitable for the larger aircraft used by the commercial airlines.

About 86% of the commuter flights connect with scheduled airline service. Translated into terms of public benefit, that 86% figure simply means that the commuters are bringing Main Street, U.S.A., about 18,000 Main Streets, a lot closer to the New Yorks, the Chicagos, the Londons and the Tokyos.

Last year, the commuters carried over seven million passengers, and hauled 215 million pounds of cargo and 109 million pounds of mail. According to the commuter industry, cargo is increasing at an annual rate of 30%, the mail 10% and passengers, 13%. The commuter is literally bringing scheduled air transportation right to the front porch.

## SPECIAL PURPOSE FLYING

Special purpose flying is the most diverse category of general aviation...battling forest fires, reforesting clearcut areas, using airplanes to study and redistribute wildlife populations, feeding livestock, using infrared photography to detect plant disease, law enforcement, highway traffic control, and a multitude of other uses.

And of extraordinary benefit to all Americans is the direct use of the airplane in agriculture. There are approximately 25,000 people employed in agricultural flying enterprises, operating some eight thousand general aviation aircraft. They seed, fertilize, and apply pesticides to more than 180 million acres of farmland each year. In fact, 90% of the U.S. rice crop is seeded by air. One airplane can do more work in one hour than a tractor can accomplish in a whole day...and do it using just one-ninth the amount of fuel. Aerial application is also more efficient because it provides greater penetration and coverage; and, more economical because less chemicals per acre are required.

## PERSONAL TRANSPORTATION

General aviation is also personal transportation which, along with proficiency flying, makes up the fourth category. Proficiency flying is simply that flying necessary to maintain the pilot skills required by Federal regulations. It is, in fact, the cornerstone of general aviation safety.

Personal transportation by general aviation aircraft is, in many respects, comparable to using the family car. However, in addition to being fuel efficient, it is much more time efficient. For example, if a family of four wants to drive from home in Memphis to visit relatives in Philadelphia (1,062 miles), travel by car at the 55 M.P.H. speed limit would take 21 hours (2 travel days) and consume 66 gallons of gas if the car averages 16

miles per gallon. Using a single-engine general aviation aircraft, the family could fly direct to Philadelphia in seven hours, only 1/3 the time it takes to drive. Flying in a straight line (873 miles, the family would be saving one travel day while using approximately the same amount of gas.

This is representative of what personal transportation means - adding wings to wheels, and transporting people in safety, in less time, and using less fuel!

## SPORT FLYING

Sport flying represents five per cent of general aviation activity. It's fun, it's excitement, it's the kind of flying that lets one escape the bonds of earth, a desire many have had since the beginning of time. This expression of freedom is also the inspiration and motivation behind many people who have made aviation their career.

## INSTRUCTIONAL FLYING

Instructional flying is the key to America's strength in aviation. In the next ten years, more than one and a half million people will learn to fly. Many of them will go on to careers in general aviation or the airlines. Others, like doctors, reporters, legislators, salesmen, will use their flying skills in connection with their own profession.

But learning to fly doesn't stop there..."We all went to the same school..."

One out of every four airline pilots in the U.S. comes directly from the ranks of general aviation. And, most of those who switched from military to airline flying got their start in general aviation. General aviation is, in effect, a manpower pool for the future, just as it has been in the past. A sizeable chunk of the pilots who guard our skies today, and who pilot the airlines, come from general aviation backgrounds.

## GENERAL AVIATION... ITS IMPACT ON OUR NATION'S GROWTH AND ECONOMY

General aviation is an industry composed mostly of small, independent businesses. However, the sum of all these businesses adds up to an industry employing a quarter of a million people...producing a five billion share of America's gross national product each year!

## GENERAL AVIATION EMPLOYMENT

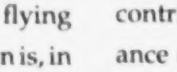
General aviation employment includes 70,000 people in sales and service support for air commuter operations, flight training, maintenance, and other systems support. There are 25,000 engaged in agricultural flying, 35,000 in corporate flight departments, and 10,000 in industrial special uses such as pipeline patrol, aerial mapping, and pollution control. Fifty thousand people are directly employed in the manufacturing of major general aviation components...from airframes and engines to instruments. Self-employed instructors and mechanics number 10,000. And 50,000 others are engaged in the manufacture of subcomponents that go into a general aviation aircraft, such as brakes, aluminum, tires, wheels, wires, gas and oil.

These 250,000 dedicated men and women are working to provide the services and benefits of an expanding general aviation industry.

## GENERAL AVIATION AND THE U.S. BALANCE OF PAYMENTS

And if general aviation helps people, it also helps the economy that supports people. General aviation contributes significantly, for example, to the U.S. balance of payments. For every general aviation aircraft imported in the United States, U.S. manufacturers are exporting 35! In 1976, U.S. general aviation manufacturers shipped 3,539 airplanes, valued at more than $331 million, to nearly 100 foreign countries.

In fact, of the 250,000 airplanes in the world's general aviation fleet, more than 90% of them have been



built in the United States. Virtually every piston engine aircraft made in the world is equipped with an American engine! And U.S. manufacturers historically export about 25% of their total general aviation production.

This takes into account the expanding role of general aviation in our own country. As an example, a United States Senator recently voiced the opinion that the vital Alaskan pipeline could never have gotten under way without the general aviation airplane. As everyone knows, the Alaskan pipeline is one of the answers to our nation's fuel shortage.

And this leads to a key point. General aviation has done, and continues to do, an enormous job. It is also significant that these important tasks are being accomplished while using only 6.7% of all the fuel used in aviation! That represents just seven-tenths of 1% of all the fuel consumed in all forms of transportation. In addition to the mushrooming role of the general aviation aircraft in helping to expand the economic growth of the U.S., it is also greatly helping the growth and prosperity of developing nations...those with virtually no rail or highway facilities. There appears to be an unlimited and continually growing need for general aviation on a worldwide basis.

This, then, is general aviation...diverse, efficient, economical and cost effective. It is truly a leading tool in the economic growth of our nation and the world.

## GENERAL AVIATION...A PUBLIC SERVICE AND A PUBLIC BENEFIT

General aviation is a growing industry...one that is helping America in a multitude of ways, providing a very significant and efficient public service.

Today, general aviation means nearly 750,000 pilots flying more than 180,000 aircraft and operating over 50 million intercity flights each year while serving a system of some 13,200 airports.

Many general aviation aircraft fly into major metropolitan areas each day in order to connect with a larger airline. However, 94% of these general aviation aircraft require less than three thousand feet of runway. This means that when general aviation operates out of major metropolitan airports, it can use much shorter runways than those designed for larger airliners.

As a result, progressive airport planners are designing separate runways for general aviation operations. More, however, are needed. In a great majority of cases, general aviation operators will use alternate or "reliever" airports where they exist. This type of airport has become an important factor in the community planning of major metropolitan areas.

As general aviation continues to perform a rapidly growing service to all aspects of our nation's population and economy, it also helps pay part of the cost of building and modernizing the technical environment in which it operates...the air traffic control system, the airport itself.

The Air Commerce Act in 1926 recognized and supported the public necessity of a national airways system. As a result, the aviation industry and the national air transportation system grew significantly.

To provide additional monetary muscle needed for modernizing and expanding the national airways system, Congress, in 1970, passed the Airport-Airways Development and Revenue Acts. Under this effective legislation, an aviation trust fund was created to meet the capital needs of the system, such as new airport construction and the development of more efficient air traffic control. Into this fund has gone billions of dollars in taxes from general aviation and the airlines.

Today, the trust fund monies collected from the users equal about half the money spent by the Federal Government to maintain and improve the system. There are few other user groups in this country that bear such a large percentage of the tax burden! Virtually everyone in aviation agrees that they should be responsible for a portion of the cost of building and modernizing a system that they use. However, the other portion should be the responsibility of the Federal Government, recognizing that the national aviation system was established as a public necessity for the good of America...public benefit if you will.

It is well demonstrated that there is at least a 50% public benefit derived from the air transportation system...a system that is the greatest in the world, built and maintained for the public.

And this public benefit is really what general aviation is all about, providing services and fulfilling needs that are far greater, more essential and vital to the American economy than ever before. Air transportation is today, the prime mover of commerce and social change. It contributes immensely to the growth and well-being of the entire nation.

General aviation has come a long way in just 74 years...from the Wright Brothers to businessmen...from stunt flying to agricultural flying...from an occasional, sometimes hazardous, charger trip to the largest air passenger carrier in the world.

# USES OF THE GENERAL AVIATION AIRPLANE

General Aviation is a diverse industry. It consists of six basic categories; business flying; air taxi; rental and commuter operations; special purpose flying; personal transportation; sport flying; and instructional flying.

## BUSINESS FLYING INCLUDES:

Flights into the nation's 14,000 airports connecting with commercial airline flights into only 450 airports.

Corporate flying by companies who own their own airplanes. Advantages include speed, convenience, flexibility, safety, accessibility to more cities, time savings and others.

## AIR TAXI, RENTAL AND COMMUTER OPERATIONS INCLUDES:

- Chartering airplanes for special trips
- Commuter Airlines between airports
- Transportation of Cargo
- Mail Operations
- Banking Operations
- Special Purpose Flying Includes:
- The use of aircraft for
- Battling forest fires
- Reforesting clearcut areas
- Studying and redistributing wildlife populations,
- feeding livestock
- Using infrared photography to detect plant disease
- Law enforcement
- Highway traffic control
- Planing crops
- Fertilizing crops

## FACTS:

Of direct benefit to all Americans is the use of the airplane in agriculture. There are approximately 25,000 people employed in agricultural flying enterprises, operating some eight thousand general aviation aircraft. They seed, fertilize, and apply pesticides to more than 180 million acres of farmland each year. In fact, 90% of the U.S. rice crop is seeded by air. One airplane co do more work in one hour than a tractor can accomplish in a whole day, and do it using just one-ninth the amount of fuel. Aerial application is also more efficient because it provides greater penetration and coverage and, more economical because less chemicals per acre are required.

## PERSONAL TRANSPORTATION INCLUDES:

Individual or family use of the airplane for transportation.

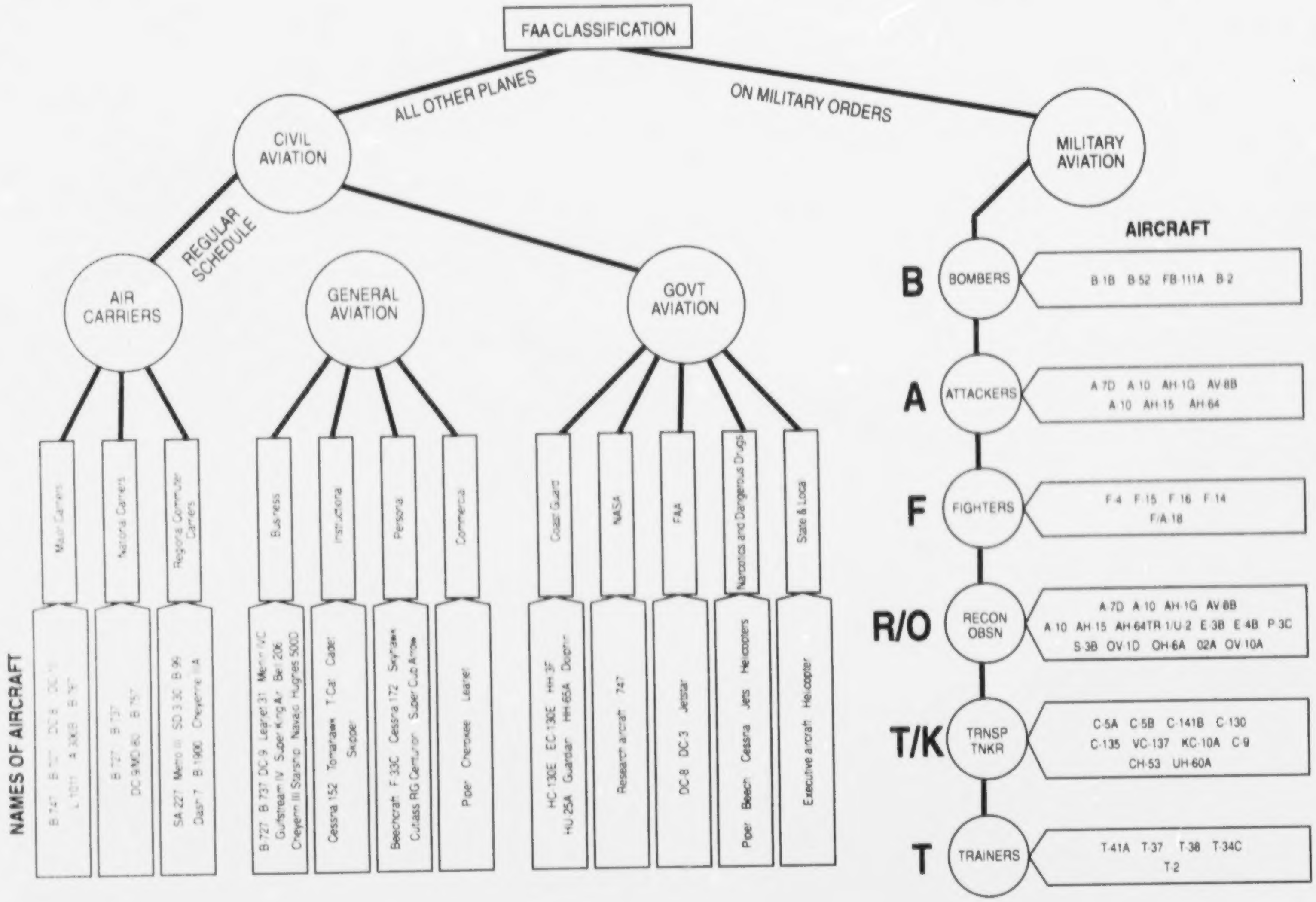
## SPORT FLYING:

Flying for fun, excitement and recreation. Some people fly in special airplanes designed for aerobatics.

## INSTRUCTIONAL FLYING:

Instructional flying is the key to America's strength in aviation. In the next ten years, more than one and a half million people will learn to fly. Many will go on to careers in general aviation or the airlines. Others, like doctors, reporters, legislators, salesmen, etc., will use their flying skills in connection with their own profession.

# AIRCRAFT CATEGORIZATION CHART


FAA CLASSIFICATION
ALL OTHER PLANES
ON MILITARY ORDERS
CIVIL AVIATION
MILITARY AVIATION
REGULAR SCHEDULE
AIR CARRIERS
GENERAL AVIATION
GOVT AVIATION
NAMES OF AIRCRAFT
Major Carriers
National Carriers
Regional Commuter Carriers
Business
Instructional
Personal
Commercial
Coast Guard
NASA
FAA
Narcotics and Dangerous Drugs
State & Local
B 747 B 727 DC 8 DC 10 L 1011 A 300B B 767
B 727 B 737 DC 9 MD 80 B 757
SA 227 Metro III SD 3 30 B 99 Dash 7 B 1900 Cheyenne IIIA
B 727 B 737 DC 9 Learjet 31 Merlin IVC Gulfstream IV Super King Air Bell 206 Cheyenne III Starship Navajo Hughes 500D
Cessna 152 Tomahawk T-Cat Cadet Skipper
Beechcraft F 33C Cessna 172 Skyhawk Cutlass RG Centurion Super Cub Arrow
Piper Cherokee Learjet
HC 130E EC 130E HH 3F HU 25A Guardian HH 65A Dolphin
Research aircraft 747
DC 8 DC 3 Jetstar
Piper Beech Cessna Jets Helicopters
Executive aircraft Helicopter
AIRCRAFT
B
BOMBERS
B 1B B 52 FB 111A B 2
A
ATTACKERS
A 7D A 10 AH 1G AV 8B A 10 AH 15 AH 64
F
FIGHTERS
F 4 F 15 F 16 F 14 F/A 18
R/O
RECON OBSN
A 7D A 10 AH 1G AV 8B A 10 AH 15 AH 64TR 1/U 2 E 3B E 4B P 3C S 3B OV 1D OH 6A 02A OV 10A
T/K
TRNSP TNKR
C 5A C 5B C 141B C 130 C 135 VC 137 KC 10A C 9 CH 53 UH 60A
T
TRAINERS
T 41A T 37 T 38 T 34C T 2

# RESOURCES

# RESOURCES FOR INFORMATION IN ALASKA

**Alaska Aviation Safety Foundation**
Mr. Tom Wardleigh
4134 Ingra Street, Suite 201
Anchorage, AK 99503
563-3751

**Alaska Ninety-Nines**
Melanie Handcock
2141 Forest Park Drive
Anchorage, AK 99503
694-4571

**Alaska Airmen's Association**
Mike Pannone
UAA Aviation Complex
1515 E. 13th Street
Anchorage, AK 99501
272-3103

**Alaska Department of Transportation and Public Facilities**
Bruce Campbell, Commissioner
Pouch Z
Juneau, AK 99811
465-3906

**Alaska Civil Air Patrol**
P.O. Box 101836
Anchorage, AK 99510
552-5367
800-478-5001

**Commander, Alaskan Air Command**
Lt. General Joseph Ralston
Elemendorf Air Force Base, AK 99506
552-2100

**National Transportation Safety Board**
Tim Borson
222 W. 7th Ave. #11
Anchorage, AK 99501
271-5001

**U.S. Department of Transportation**
Office of Community and Consumer Affairs
Dick Steinman
801 B. Street, Suite 506
Anchorage, AK 99501
271-5147

**Alaska DOT/PF, Statewide Aviation**
Lowell Humphrey
P.O. Box 196900
Anchorage, AK 99519
266-1440

**Museum of Alaska Transportation And Industry**
Harry Yost
P.O. Box 870646
Wasilla, AK 99687

**Alaska Aviation Heritage Museum**
4721 Aircraft Drive
Anchorage, AK 99519
248-5325

**Federal Aviation Administration**
Mary Lou Dordan
Aviation Education Programs
222 W. 7th, #14
Anchorage, AK 99513
271-5293

**American Society for Engineering Education**
One Dupont Circle
Washington, D.C. 20036

**American Society of Aviation Writers**
Six West Park Place
Great Neck, NY 11023

**American Society of Civil Engineers**
345 East 47th Street
New York, NY 10017

**Aviation Distributors and**
**Manufacturers Association**
1900 Arch Street
Philadelphia, PA 19103

**Chief of Education**
National Air and Space Museum
Washington, D.C. 20560

**Experimental Association**
Wittman Field
Oshkosh, WI 54903-3086

**Federal Aviation Administration**
Aviation Education Program,
APA-120
Washington, D.C.

**General Aviation Manufacturers Association**
1400 K St., N.W., Suite 801
Washington, D.C. 2005

**International Society of Women Airline Pilots**
P.O. Box 38644
Denver Co 80238

**National Aeronautics & Space Administration**
Office of Public Affairs, Code AP
Johnson Space Center
Houston, TX 77048
Attn: Agencywide Federal Women's Program Manager

**NASA Headquarters**
Mail Code XH
Washington, D.C. 20546

**National Aeronautic Association of The U.S.A.**
1400 Eye Street #550
Washington, D.C. 20005

**National Association of Air Traffic Specialization**
Suite 415
Wheaton Plaza North
Wheaton, MD 20902

**National Association of Flight Instructors**
P.O. Box 793
Dublin, OH 43017

**National Association of State Aviation Officials**
Suite 505
8401 Colesville Road
Silver Spring, MD 20910

**National Agriculture Aviation Association**
1005 E Street, SE, Suite 103
Washington, D.C. 20003

**National Air Transportation Association**
4226 King Street
Alexandria, VA 22302

**National Black Coalition of Federal Aviation**
**Employees**
P.O. Box 521004
Tulsa, OK 74152

**National Business Aircraft Association**
1200 18 St. NW, 2nd Floor
Washington, D.C. 20036

**National Congress on Aviation**
**and Space Education**
HQ CAP/ED
Maxwell Air Force Base, AL 36112

**National Council for Women in Aviation/Aerospace**
**(NCWA)**
P.O. Box 6184
Benjamin Franklin Station
Washington, D.C. 20044

**Ninety-Nines, Inc.**
P.O. Box 59965
Will Rogers Airport
Oklahoma City, OK 73159

**Professional Aviation Maintenance Association**
500 Northwest Plaza, Suite 401
St. Ann, MO 63074

**The Institute of Electrical and**
**Electronics Engineers, Inc.**
345 East 47th Street
New York, NY 10017

**The Society of Women Engineers**
United Engineering Center
345 East 47th Street, Rm. 315
New York, NY 10017

**Women's Educational Equity Act Program**
WEEA Publishing Center
55 Chapel Street, Suite 200
Newton, MA 02160

**Women's Military Pilots Association**
1520 Beck Drive
Colorado Springs, CO 80908

**Whirly Girls**
1619 Duke Street
Alexandria, VA 22314

**University Aviation Association**
P.O. Box 2321
Auburn, AL 36830

# RESOURCES

## AUDIO-VISUALS:

### Film:

***Making the Difference***
Available free from:
GAMA
(General Aviation Manufacturer's Association)
Suite 517
1025 Connecticut Avenue, N.W.
Washington, D. C. 20036
(202) 296-8848

### Film:

***Discover Flying***
Available free from:
Beech Aircraft Corporation
Audio-Visual Department
P.O. Box 85
Wichita, Kansas 67201
(316) 681-8171

## WOMEN IN AVIATION AND SPACE A BRIEF BIBLIOGRAPHY:

### General Interest Books

Brooks-Pazmany, Kathleen L. United States Women in Aviation, 1919-1929. Washington, D.C., Smithsonian Institution Pr., 1983.

Earhart, Amelia. Letters from Amelia, 1907-1937. Boston: Beacon Press, 1982.

Goerner, Fred G. The Search for Amelia Earhart. Garden City, New York: Doubleday, 1966.

Klaas, Joe. Amelia Lives; a Trip Through Intrigue to Find America's First Lady of Mystery. New York: McGraw-Hill, 1970.

Keil, Sally Van Wagenen. Those Wonderful Women In Their Flying Machines: The Unknown Heroines of World War II. New York: Ranson, Wade, 1979.

Lauwick, Herve. Heroines of the Sky: Women in Aviation. Cortaro, AZ: Beachcomber, 1960.

Loomis, Vincent V. Amelia Earhart, The Final Story. New York: Random House, 1985.

May, Charles Paul. Women In Aeronautics. New York: Nelson, 1962.

Moolman, Valerie. Women Aloft. Alexandria, VA: Time-Life, 1981.

Oakes, Claudia M. United States Women In Aviation Through World War I. Washington, D.C.: Smithsonian Institution Pr., 1978.

Smith, Elizabeth Simpson. Breakthrough, Women In Aviation. New York: Walker, 1981.

Tiburzi, Bonnie. Take Off: The Story of America's First Woman Pilot for a Major Airline. New York: Crown, 1984.

### Juvenile Books

Behrens, June. Sally Ride, Astronaut: an American First. Chicago: Children's Pr., 1984.

Blacknall, Carolyn. Sally Ride: America's First Woman in Space. Minneapolis: Dillon, 1984.

Chadwick, Roxane. Anne Morrow Lindbergh: Pilot and Poet. Minneapolis: Lerner Publications, 1986.

Fisher, Marquita O. Jacqueline Cochran: First Lady of Flight. Easton, MD: Garrard, 1973.

Fox, Mary V. Women Astronauts: Aboard The Shuttle. New York: Messner, 1985.

Gennett, Ann. Contributions of Women: Aviation. Minneapolis: Dillion, 1975.

Hodgman, Ann. Skystars: The History of Women In Aviation. New York: Atheneum, 1981.

Monday, David. Women of the Air. Morristown, NJ: Silver Burdett, 1982.

Moolman, Valerie. Women Aloft. Alexandria, VA: Time-Life 1981,.

O'Connor, Karen. Sally Ride and the New Astronauts. Danbury, CT: Watts, 1983.

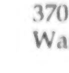
## ASSOCIATIONS/INTEREST GROUPS

**Aircraft Owners and Pilots Assn.**
421 Aviation Way
Frederick, MD 21701

**Air Traffic Control Association**
2020 North 14th Street, Suite 410
Arlington, VA 22201

**American Association of Airport Executives**
4224 King Sheet
Alexandria, Va 22302

**American Institute of Aeronautics and Astronautics, Inc.**
370 L'Enfant Promenade S.W.
Washington, D.C. 20024-2518



# ATTACHMENTS

A. Poster
B. Aviation in My Community
C. A Flying Start
D. The Sky's the Limit
E. AOPA Fact Sheet
F. FAA FEDIX
G. FAA Aviation Career Education (ACE) Academies Info
H. Alaska Equity Publications
I. Feedback form

US Department of Transportation
Federal Aviation Administration

# List of FAA Aviation Education Materials

1992

**Teaching Materials including:**

- Airplanes
- Airports
- Aviation Careers
- Curriculum Guides
- All Disciplines
- Science & Math

**FEDIX - Federal Education Information**
All aviation education materials are listed in the **FEDIX clearinghouse.** Access via any computer with modem.

Data Line: **1-800-232-4879**
Help Line: **301/975-0103**

**APA-6-152-92**

U.S. Department
of Transportation
Federal Aviation
Administration
800 Independence Ave., S.W.
Washington, D.C. 20591
Official Business
Penalty for Private Use $300

Office of Public Affairs
APA-120

# FAA AVIATION EDUCATION MATERIALS

## 1992

As part of an effort to promote better understanding of aviation and the role of air transportation in today's world, the Federal Aviation Administration offers a selection of educational publications for teachers and students. These publications are designed to provide instructional materials consisting of accurate, timely information to enrich and enhance general study programs with concepts relating to aviation. The publications are distributed free of charge.

### COLLEGE AND UNIVERSITY EDUCATION

**FEDIX**-On-line integrated informational system.

**This is the FAA** - The story of the Federal Aviation Administration and FAA Legislative History.

**Women in Aviation and Space** - Personality profiles of women who have succeeded in non-traditional careers.

### MIDDLE AND SECONDARY LEVEL

**Aviation Curriculum Guide for Middle School and Secondary School Levels** - Unit lessons and activities on language arts, science, math, and social studies.

**NAAA/Curriculum Guide for Secondary Level** - This guide presents lessons and activities suitable for social studies, mathematics, language arts, science, vocational agricultural classes as well as career education.

**A Model Aerospace Curriculum** - (August Martin High School, NY). Hands-on activities and learning tasks demonstrating motivational aspects of aviation.

### ELEMENTARY LEVEL

**Aviation Science Activities for Elementary Grades** - Pamphlet containing science demonstrations pertaining to physical properties of air. Experiments use simple equipment.

**Demonstration Aids for Aviation Education** - Set of science teaching strategies for independent or classroom work.

**NAAA/Curriculum Guide for Elemtentary Level** - This guide presents lessons and activities suitable for social studies, mathematics, language arts, science, vocational agricultural classes as well as career education.

**Nuestro Primer Vuelo** - Spanish version of How We Made the First Flight.

**A Trip to the Airport** - English-Spanish bilingual materials. Bilingual text plus supplemental teaching materials.

**August Martin Activities Book** - Learning activities based on a biography of the world's first black airline pilot.

**Safety in the Air** - Six unit lessons of flight and the air traffic control system.

**The Main Parts of the Airplane** -Two-part worksheet identifying the main parts of an airplane & instrument panel.

**Teachers' Guide for Aviation Education for Grades 2-6.** - Study unit lessons of science, health, social studies, communications arts, and career education.

**How We Made the First Flight** - In Orville Wright's own words, a description of his and Wilbur's first flights.

### AVIATION CAREER SERIES:

Your Career in Aviation: "The Sky's the Limit"
Pilots and Flight Engineers
Flight Attendants
Airline Non-Flying Careers
Aircraft Manufacturing
Aviation Maintenance and Avionics
Airport Careers
Government Careers
Women in Aviation

### ALL EDUCATION LEVELS

**Aviation Education Resource Center** - An FAA Aviation Education distribution center which provides aviation educational materials and resources.

**Teacher's Guide to Aviation Education Resources** - Lists free or low-cost classroom teaching materials, career information, audiovisuals, publications, and periodicals.

**List of Aviation Education Materials** - Listing of all aviation education materials and ordering instructions.

**Aviation Education Programs & Materials Brochure** - Overview of all materials description of all aviation educational programs and materials.

**Guide to FAA Publications** - Listing of FAA publications as well as aviation education-related materials issued by other federal agencies.

**FAA Film/Video Catalog** - 16-page film/video catalog describes 49 16mm motion pictures and VHS videocassettes available for audience viewing and ordering instructions.

BEST COPY AVAILABLE

## ORDERING INSTRUCTIONS

Single copies of these publications will be provided. However, these materials may be reproduced in their entirety or in part without permission from the Federal Aviation Administration. The agency does not maintain a mailing list for updated career materials.

To order, simply place an "X" beside each publication desired on the order form below.

### AVIATION EDUCATION MATERIALS ORDER FORM

| | Stock # | Title |
|---|---|---|
| | GA-20-30 | Aviation Science Activities for Elem. Grades |
| | GA-20-30B | Demonstration Aids for Aviation Education |
| | | NAAA/Curriculum Guide for Elem. Students |
| | GA-20-625 | Nuestro Primer Vuelo |
| | GA-300-120 | A Trip to the Airport |
| | GA-300-143A | August Martin Activities Book |
| | APA-5-146-83 | Safety in the Air:Unit Guide |
| | APA-158-91 | The Main Parts of an Airplane |
| | APA-6-153-91 | Teacher's Guide for Aviation Ed., Grades 2-6 |
| | APA-6-155-88 | How We Made the First Flight |
| | APA-100-90 | Aviation & Space Curriculum Guide K-3 |
| | APA-5-145-83 | Aviation Curriculum Guide for Middle & Secondary Levels |
| | | NAAA/Curriculum Guide for Secondary Level |
| | GA-300-143B | A Model Aerospace Curriculum |
| | GA-300-144 | Women in Aviation & Space |
| | PA-120-91 | Your Career in Aviation "The Sky's the Limit" |
| | PA-121-91 | Pilots & Flight Engineers |
| | PA-122-91 | Flight Attendants |
| | PA-123-91 | Airline Non-Flying Careers |
| | PA-124-91 | Aircraft Manufacturing |
| | PA-125-91 | Aviation Maintenance & Avionics |
| | PA-126-91 | Airport Careers |
| | PA-127-91 | Government Careers |
| | PA-128-91 | Women in Aviation |
| | PA-129-92 | Aviation Education Resource Centers |
| | APA-ATC-008 | Air Traffic Control Specialist |
| | APA-ASI-006 | Aviation Safety Inspector |
| | APA-5-149-92 | Teacher's Guide to Aviation Education Resources |
| | APA-6-152-92 | List of Aviation Education Materials |
| | APA-6-156-92 | Aviation Ed. Programs & Materials Brochure |
| | | This is the FAA |
| | FAA-APA-PG-13 | Guide to FAA Publications |
| | FAA-APA-FVC-88 | FAA Film Catalog/Video Catalog |

Print your name, address, and zip code on label.

Mail order form, complete with return label, in a stamped envelope to:

Government Printing Office
Superintendent of Documents
Retail Distribution Division
Consigned Branch
8610 Cherry Lane
Laurel, MD 20707

Please note:
Label below is for use by the Superintendent of Documents only, to send the publication(s) you order.

Name (print or type)

Street and Number (or P.O. Box)

City

State

Zip Code

BEST COPY AVAILABLE

## FEDERAL AVIATION ADMINISTRATION
## Aviation Education Offices...

**Aeronautical Center**, AAC-5
Robert Hoppers
Room 308, H-West
PO Box 25082
Oklahoma City, OK 73125
(405) 680-7500

**Center for Management Development**
Larry Hedman
4500 Palm Coast Parkway, S.E.
Palm Coast, FL 32137
(904) 445-6381

**Technical Center**, ACM-100
Michele Pareene
Atlantic City International Airport
Human Resource Management Division
Atlantic City, NJ 08405
(609) 484-6681

**Alaskan Region**, AAL-5B
Mary Lou Wojtalik
222 West 7th Avenue, # 14
Anchorage, AK 99513-7587
(907) 271-5169
State: Alaska

**Central Region**, ACE-5
Patrice Shalda
601 East 12th Street
Federal Building, Room 1501
Kansas City, MO 64106
(816) 426-5449
States: Iowa, Kansas, Missouri, and Nebraska

**Eastern Region**, AEA-15C
Charles Pagnini
JFK International Airport
Federal Building
Jamaica, NY 11430
(718) 917-1056
Sates: Delaware, District of Columbia, Maryland, New Jersey, New York, Pennsylvania, Virginia, and West Virginia

**Great Lakes Region**, AGL-5A
Lee Carlson
O'Hare Lake Office Center
2300 East Devon Avenue
Des Plaines, IL 60018
(312) 694-7042
States: Illinois, Indiana, Michigan, Minnesota, North Dakota, Ohio, South Dakota, and Wisconsin

**New England**, ANE-3
Sheila Bauer
12 New England Executive Park
Burlington, MA 01803
(617) 273-7247
States: Connecticut, Maine, New Hampshire, Rhode Island, Vermont, and Massachusetts

**Northwest Mountain Region**, ANM-5E
Shelly McGillivary
1601 Lind Avenue, SW
Renton, Washington 98055
(206) 227-2804
States: Colorado, Idaho, Montana, Oregon, Utah, Washington, and Wyoming

**Southern Region**, ASO-5
Mary Ann Cassano
PO Box 20636
Atlanta, GA 30320
(404) 763-7201
States: Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, Tennessee, Puerto Rico, and the Virgin Islands

**Southwest Region**, ASW-5
Debra Myers
4400 Blue Mound Road
Ft. Worth, TX 76193-0005
(817) 624-5804
States: Arkansas, Louisiana, New Mexico, Oklahoma, and Texas

**Western-Pacific Region**, AWP-5
Hank Verbais
PO Box 92007
Worldway Postal Center
Los Angeles, CA 90007-2007
(213) 297-1431
Sates: Arizona, California, Nevada, and Hawaii

☆U.S. GOVERNMENT PRINTING OFFICE: 1992-0-321-377

# ELLEN PANEOK

FEATURED IN

# *Women and Minorities in Alaskan Aviation*

Written by Mary Lou Dordan and Deborah Nicholson

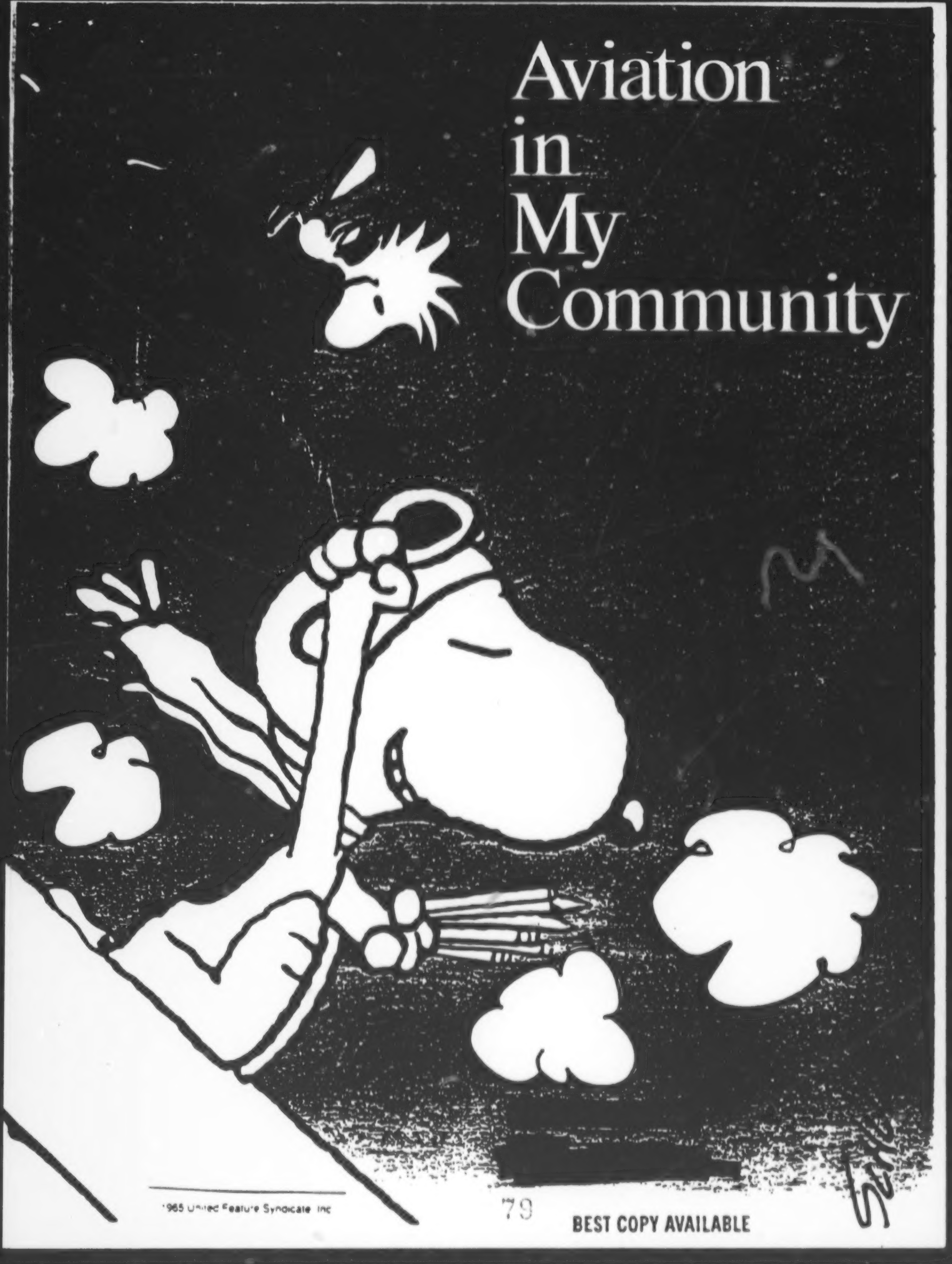
ALASKAN EQUITY PUBLICATION • 1994

Funding for this project is provided, in part, by Title IV, Civil Rights, Section 403 (c), State Education Agency, Desegregation of Public Education Program, CFDA Number 84-004 and Carl D. Perkins, Vocational and Applied Technology Education Act of 1990

Developed by the Alaska Department of Education, 801 West 10th Street, Suite 200, Juneau, AK 99801-1894

State of Alaska, Department of Education

# Aviation in My Community



[redacted]

©1965 United Feature Syndicate, Inc

BEST COPY AVAILABLE

CE

# Dear Teacher:

My name is Mary Jo Knouff. I'm a former classroom teacher, a private pilot, an aviation and aerospace enthusiast, and an education specialist with the Federal Aviation Administration (FAA). You may be wondering why the FAA is interested in classroom activities and is sponsoring this Aviation Awareness Contest. Here's the reason for that interest...

In my early days in the classroom, I discovered the powerful learning effects that aviation could have on my students: The excitement of aviation motivated them to learn and participate more actively in their education.

Many other teachers have found this to be true. That is why the Federal Aviation Administration and the National Association of State Aviation Officials are sponsoring this aviation education project and competition on the theme, "Aviation in My Community." Our goal in doing this is to promote better understanding among students of aviation and the role of air transportation in the complex modern world, and in particular, to focus attention on how the airport serves as a dynamic element in a community's transportation system.

*Mary Jo Knouff, 1985 Brewer Trophy Winner, The Nation's Highest Award "For Contributions of Enduring Value to Aerospace/Aviation Education."*

We believe the multidisciplinary, interdisciplinary nature of the subject of aviation has the power to stimulate interest among your students and motivate their learning. Therefore, we hope you will adopt the theme, "Aviation in My Community" as a classroom project, if you have not already done so.

We have compiled some suggestions to teachers for infusing aviation content into the various curricular areas, and following that, we have listed some additional sources of information and teaching materials you may wish to utilize. The list includes community and state resources, as well as published information. Best of all, it's free.

As the concluding portion of this aviation learning activity, we are sponsoring an "Aviation Awareness" contest to give your students the opportunity to communicate and share their findings with others. We hope you will encourage all students to participate in this activity as everyone has a chance to win recognition and prizes. Contest entries are to be written on the general topic of "Aviation in My Community."

This contest is for students in grades four through twelve, and includes three categories:

**Intermediate**, for grades four to six

**Junior**, for grades seven to nine

**Senior**, for grades ten to twelve

Complete contest rules are included in this package, and may be reproduced so that each student may have a copy.

Whether or not you choose to include aviation in your teaching plans this year, we hope you will encourage your students to identify an area of aviation that interests them to do an independent study project on the subject of aviation. I believe you will discover, as I did, how the excitement of aviation and aerospace can make the difference in your students' motivation and learning.

Thank you for giving this your thoughtful consideration.

Mary Jo Knouff

BEST COPY AVAILABLE

# Infusing Aviation Topics Into Classroom Studies

## SCOPE OF AVIATION

First, let us define the scope of aviation to help clarify its relationship to your classroom.

Air Transportation—the movement of people, goods and services by air—has affected people's lives profoundly in many ways and on many levels: family, community, state, national, and global.

Aviation is closely linked with technology; the story of the progress and growth of aviation is the story of technological advance. What the Wright Brothers started at Kitty Hawk in 1903 has led to space flight and in the process, changed life on earth forever.

There are over 16,000 landing facilities serving the air transportation needs of people in communities and states throughout the United States. This includes civil and joint-use airports, heliports, STOL ports (short take-off and landing facilities), and seaplane bases. Many communities are within a few miles of an airport.

Some facilities are small, unattended and unlighted. Others, large and complex, handle thousands of passengers and tons of freight every day. Airports provide a community with access to the world's goods and services, as well as transport to markets for the goods and services produced in that community.

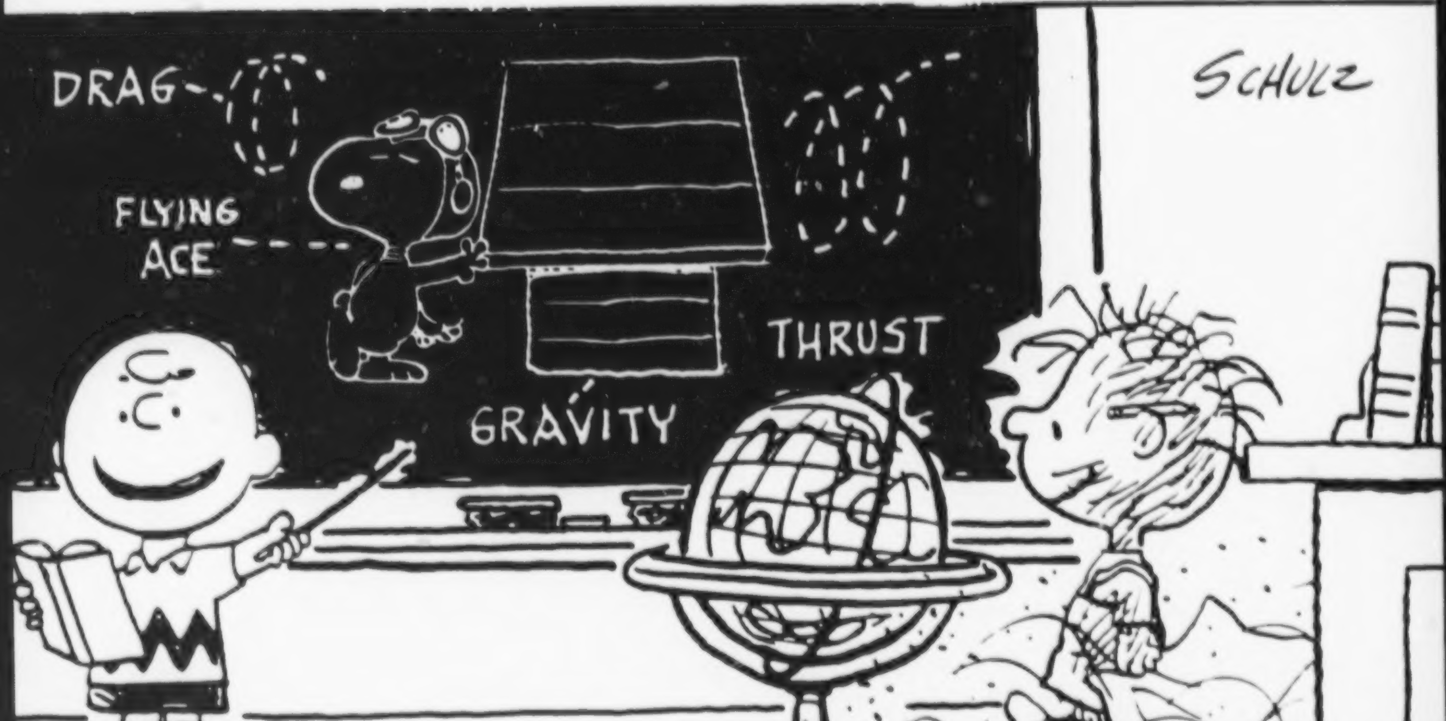
United States-produced aircraft and related technological product sales to countries around the world—and the continuing markets for parts and maintenance services for those products—provide significant economic benefits to our country in terms of employment and balance of trade with foreign countries.

## Excitement of Aviation

The excitement of aviation offers teachers many approaches to classroom enrichment for both motivational and informational purposes. Since it is interdisciplinary, it can easily be woven into every curricular area or discipline. How airplanes fly is ***SCIENCE***; how they are built is ***INDUSTRIAL ARTS***; where they fly is ***GEOGRAPHY***; who controls them is ***GOVERNMENT***; what they cost is ***ECONOMICS***; where they land is ***SOCIAL STUDIES***; and who made them fly is ***HISTORY***.

Some examples are:

- Developing awareness of the role of aviation in human history.
- Understanding the development of aviation and its influence on developing technology.
- Increasing skills in reading and interpreting maps and globes, and locating places on the earth's surface.
- Discovering career and vocational opportunities in aviation.
- Understanding the role of airports in the communities they serve.
- Tracing social, economic, and physical changes resulting from the progress of aviation and related technology.
- Encouraging independent study to increase communications and language skills.
- Learning the science of flight and the environment of flight: how airplanes fly; weather; navigation and flight planning; the 24-hour clock and Greenwich Mean Time; use of measuring instruments such as compass, airspeed indicator, and altimeter.
- Appreciating the cultural effects of aviation on modern life; art, literature, language, music, and drama.



1950, 1954, 1965, 1966, 1968, 1971 United Feature Syndicate, Inc

# Adaptability of Aviation

Within each classroom, whether you have a self-contained classroom or you teach only one or two subjects, you and your students can think of many interesting and relevant activities to do as part of an aviation theme project. Students will enjoy and benefit by participating in both whole-class and individual activities. Aviation lends itself well to application in many ways. We have listed some below to help you get started.

**1.** Develop a pictorial time line showing significant transportation developments from earliest time until the Space Shuttle.

**2.** Develop a list of ways in which people's lives have changed as a result of human flight.

**3.** Identify careers that were made possible by the development of aviation.

**4.** Invite someone from aviation to speak to the class. Or, plan a series of speakers on several different careers in aviation.

**5.** Study the local airport: people employed, businesses located there, sources of revenue, type of facilities for pilots, number of passengers enplaned each year, kinds of airplanes using it, etc.

**6.** Plan a field trip to the airport. (Call the airport manager's office to arrange the tour). Develop a list of questions to have answered by airport officials.

**7.** Plan a bulletin board highlighting aviation in your locality.

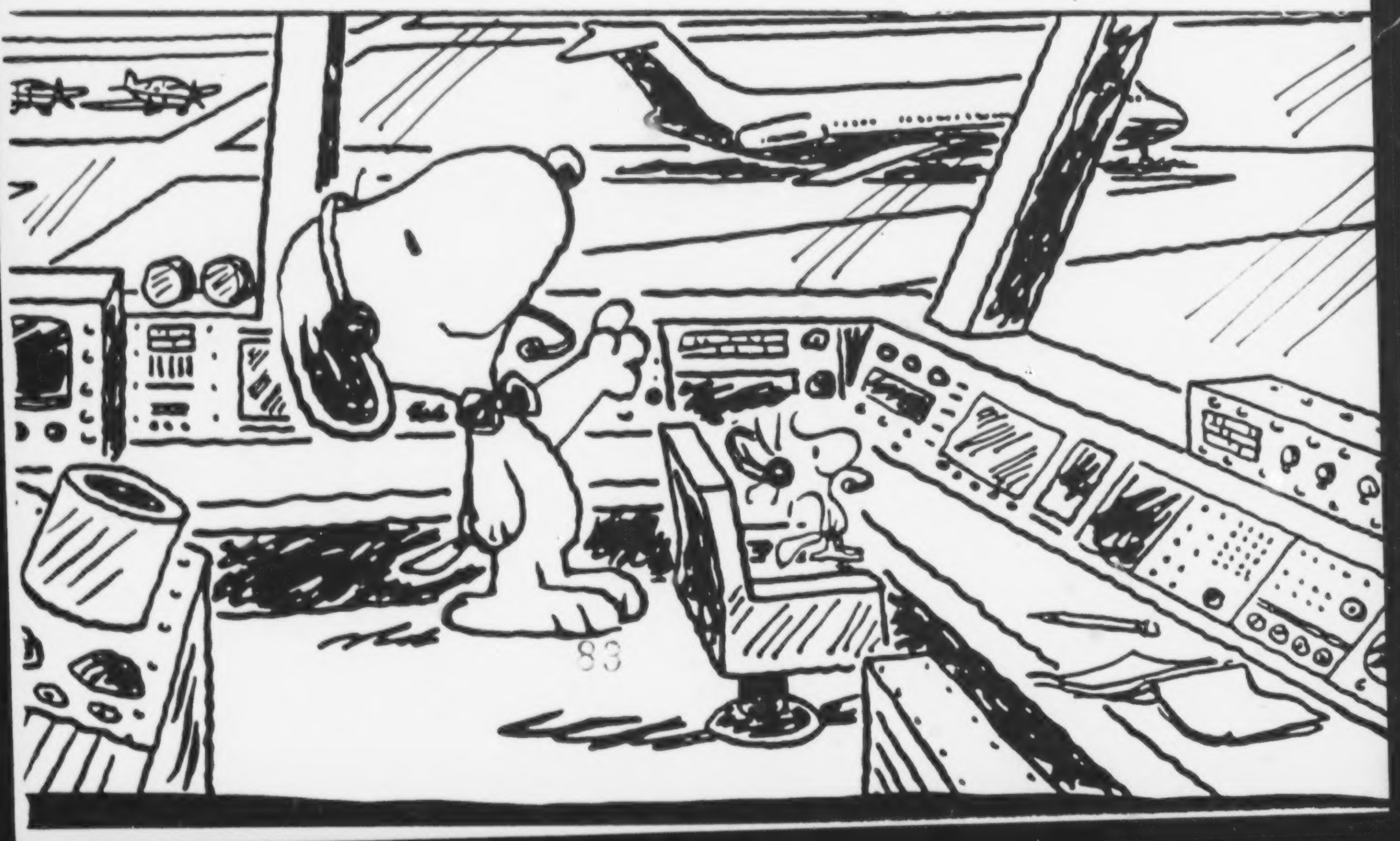
**8.** Acquire an aerial chart and compare it with a road map. Find out how pilots navigate and plan their flights.

**9.** Compile a list of books in the libraries about aviation. Include fiction, nonfiction, memoirs, biographies, and poetry.

**10.** Interview and tape-record conversations with older local citizens, who may recall earlier aviation events, local or otherwise.

**11.** Write scripts for and dramatize portions of significant events drawn from the history of human flight.

**12.** Collect pictures, advertising slogans, logos, and symbols that represent flight. Write captions and arrange for display.



13. Research from all available sources topics from students' own aviation interests: early aviation heroes and heroines, kites, model airplanes, gliders, helicopters, parachutes, balloons, dirigibles, hang gliders and ultralights.

14. Identify purposes for oral communications by workers at the airport.

15. As a class project, arrange for panel discussions on the topics of "Effects of Aviation on My Community."

16. Use the Yellow Pages of the Telephone Directory to find aviation listings. Discuss each one in terms of its relationship to air travel.

17. Recall, in sequence, events of a story or poem read aloud or told about flying.

18. Identify forms of stereotyping: ("male" pilots, "female" flight attendants, weather "man," etc.).

19. Use the enclosed "Compass Rose Game" to introduce navigation. Instructions are given, or you may vary as you please.

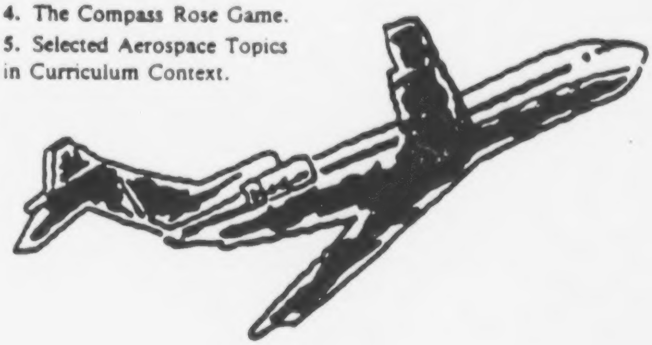
20. "Parts of an Airplane" (enclosed) can help build vocabulary, identify shapes, and spark inquiry.

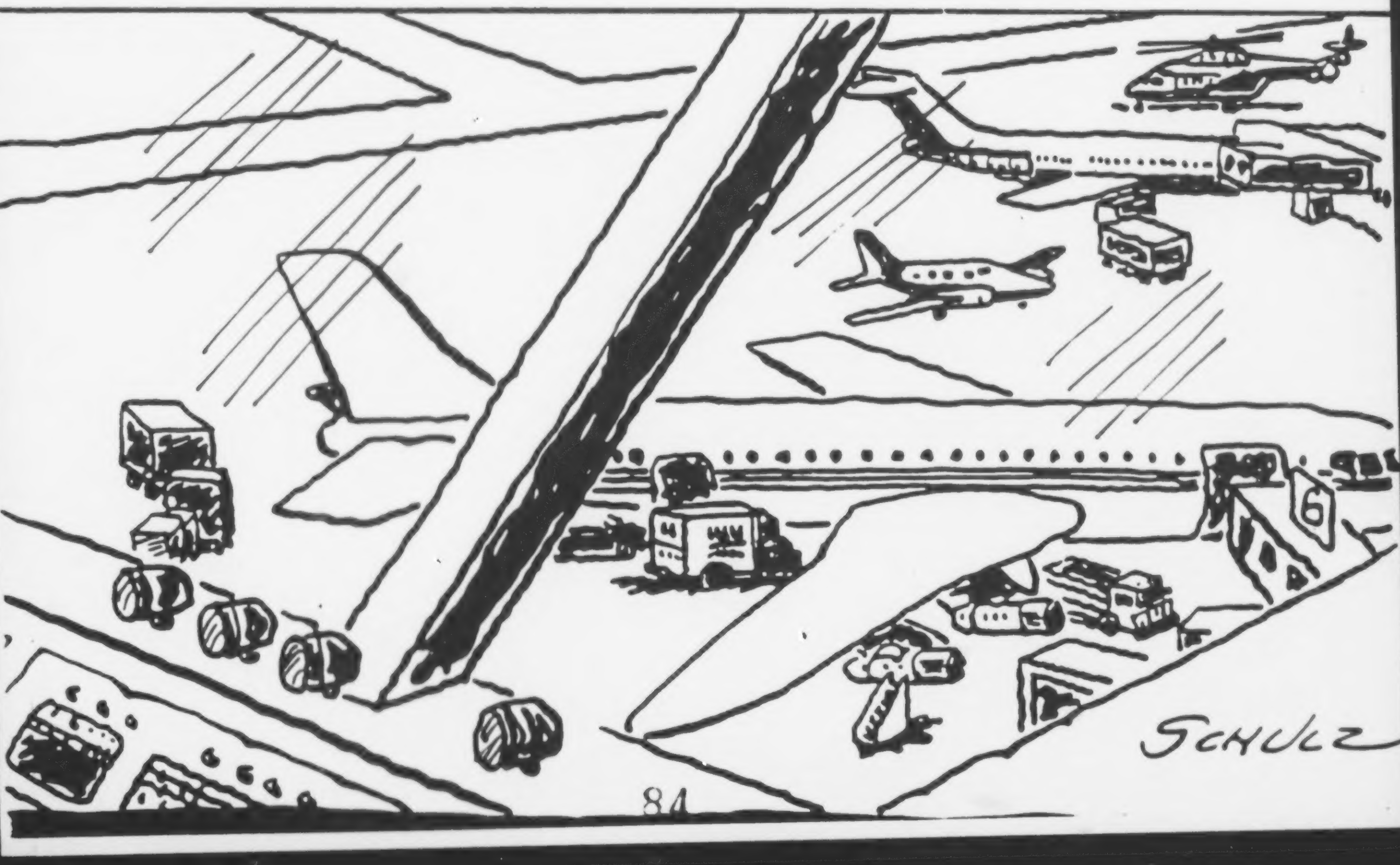
21. "Model Layout of an Airport" (enclosed) includes suggestions for use.

22. "Selected Aerospace Topics in Curriculum Context" (enclosed) lists the many ways that aviation and aerospace topics can be introduced into the academic curriculum.

**Items Included in this Package:**

1. List of Careers in Aviation, with sources of information.
2. Model Layout of an Airport.
3. Chart: The Main Parts of an Airplane.
4. The Compass Rose Game.
5. Selected Aerospace Topics in Curriculum Context.





## Sources of Aviation Information in Your Community:

1. The local airport manager's office (see the Yellow Pages of the Telephone Directory).
2. Your State's aviation official (list is enclosed in this package).
3. The Federal Aviation Administration (see the Yellow Pages of the Telephone Directory under "U.S. Government—Department of Transportation, Federal Aviation Administration").

## Some Careers in Aviation:

Accident Investigators
Air Freight/Cargo Agents
Air Traffic Controllers
Airport Managers
Aviation Electronics Technicians (Avionics)
Aviation Maintenance Technicians (Mechanics)
Aviation Safety Inspectors
Engineers
Fixed Base Operators
Flight Attendants
Flight Dispatchers
Flight Engineers
Ground Attendants
Meteorologists
Passenger Service Agents
Pilots: Commercial, Military, Corporate, General & Business Aviation
Ramp Servicepersons
Reservations Sales Agents
Schedule Coordinators
Teletypists
Ticket Agents

## Materials to Write for:

The following publications are distributed free of charge for single copies. (Be sure to enclose a self-addressed mail label with your order.)

### For Elementary Level:

GA-20-30—**Aviation Science Activities for Elementary Grades.** Pamphlet containing science demonstrations pertaining to physical properties of air. Experiments use simple equipment.

GA-20-30B—**Demonstration Aids for Aviation Education.** Set of science teaching strategies for independent or classroom work.

GA-20-62—**How We Made the First Flight.** In Orville Wright's own words, a description of his and Wilbur's first flights.

GA-20-62S—**Nuestro Primer Vuelo.** Spanish version of GA-20-62.

GA-300-120—**A Trip to the Airport.** Contains English-Spanish bilingual materials. Bilingual text plus supplemental teaching materials.

GA-300-135—**Teachers' Guides for Aviation Education.** For teachers of grades two—six.

GA-300-143A—**August Martin Activities Book.** Learning activities based on a biography of the world's first black airline pilot.

**For Middle and Secondary Level:**

GA-300-143B—**A Model Aerospace Curriculum.** Describes the aerospace thematic program of August Martin High School, N.Y.

APA-5-145-83—**Aviation Curriculum Guide for Middle School and Secondary School Levels.** Guides for language arts, science, math, social studies.

APA-5-146-83—**Safety in the Air.** Six lessons on flight and the air traffic control system.

## Career Information You Can Write For:

The following publications are distributed free of charge for single copies. (Be sure to enclose a self-addressed mail label with your order.)

**Careers in Aviation Series**

GA-300-122—Career Pilots and Flight Engineers.

GA-300-123—Aviation Maintenance.

GA-300-124—Airport Careers.

GA-300-125—Aircraft Manufacturing Occupations.

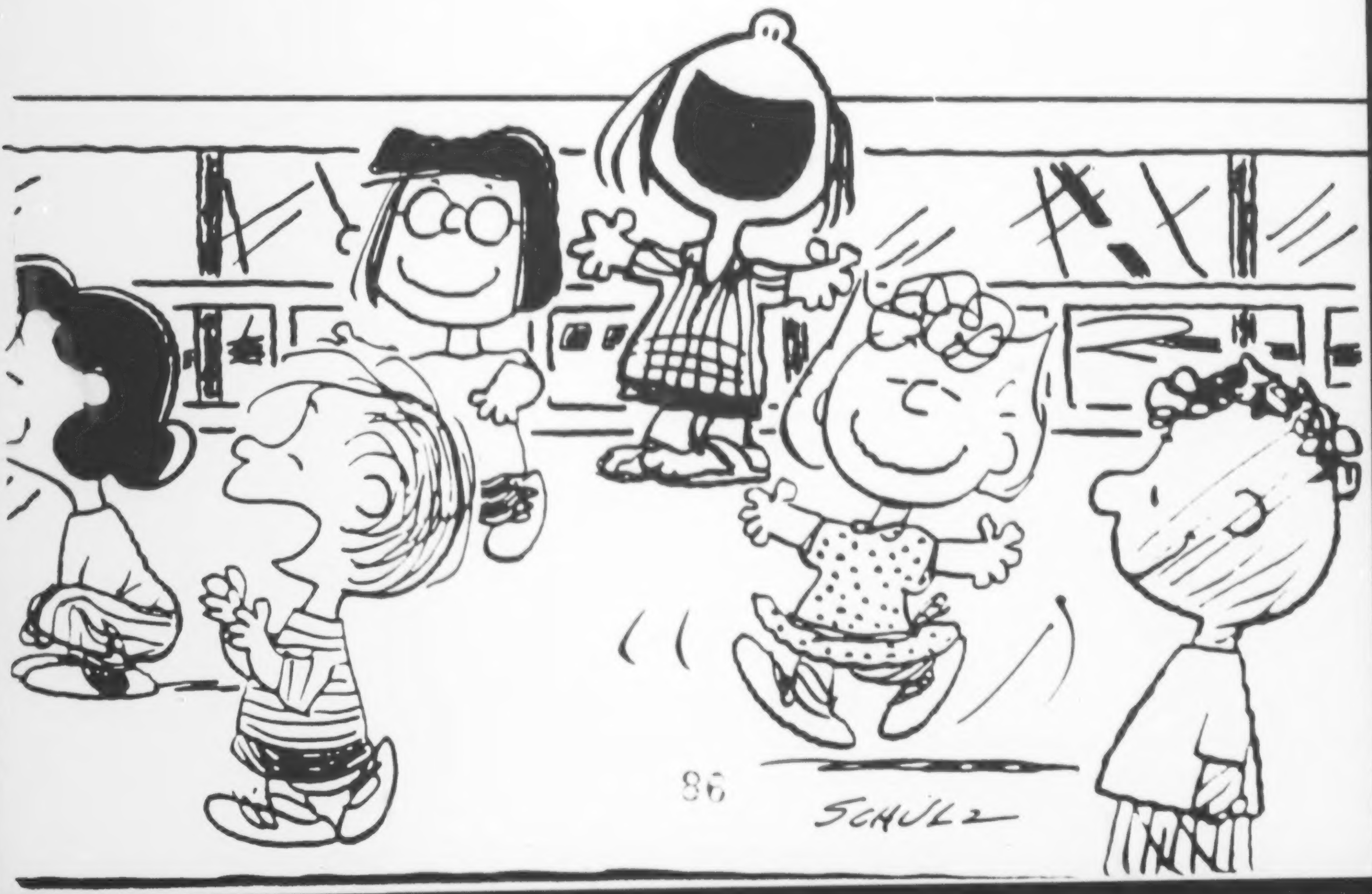
GA-300-126—Airline Careers.

GA-300-127—Flight Attendants.

GA-300-128—Government Careers.

**Mail your order, complete with a return label, in a stamped envelope to:**

**Superintendent of Documents**
**Retail Distribution Division**
**Consigned Branch**
**8610 Cherry Lane**
**Laurel, Maryland 20707**

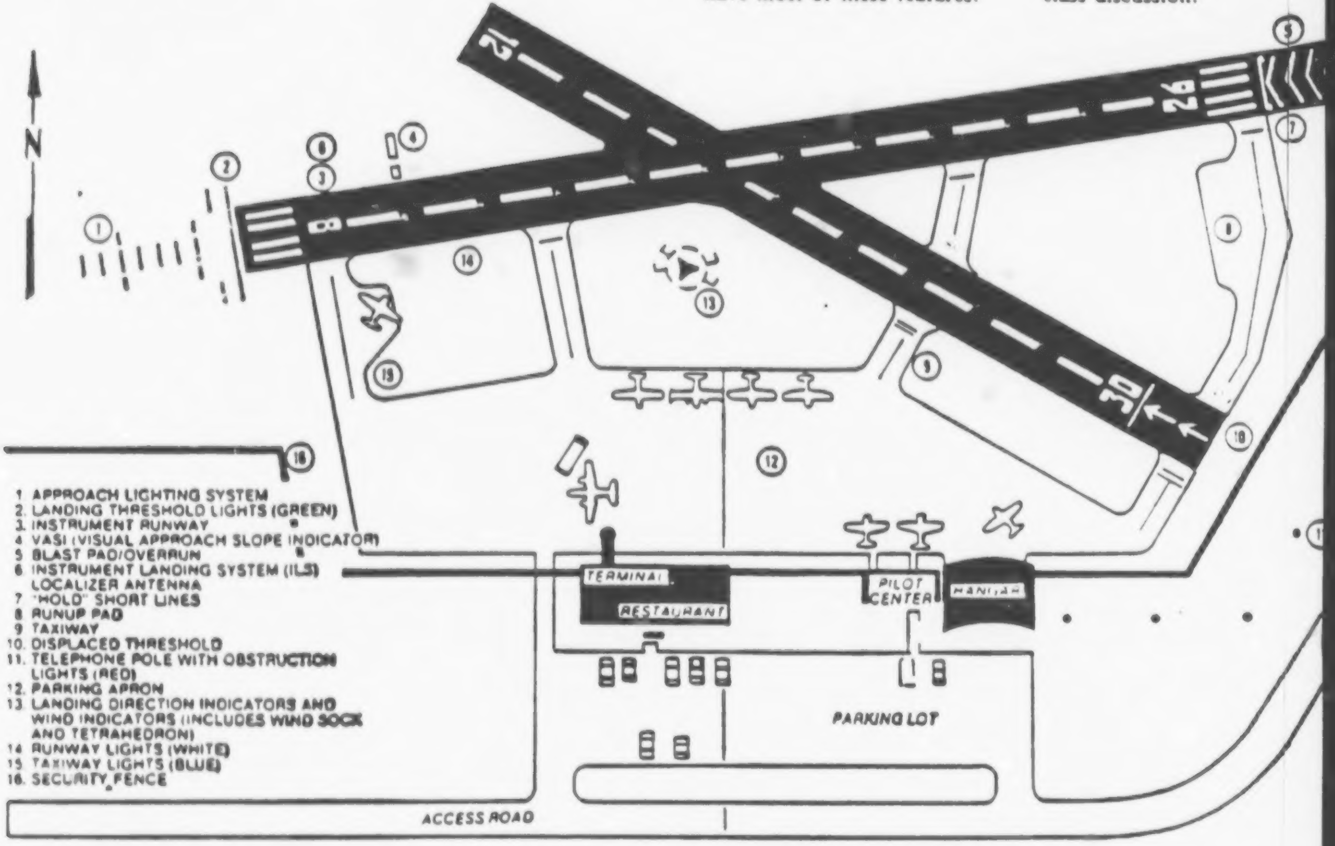


# The Airport in Your Community

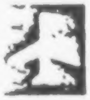
## Model Layout of an Airport

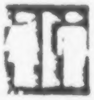
Ninety percent of all airports in the U.S. do not have all the facilities shown in the composite layout shown below; however, the largest airports have most of these features.

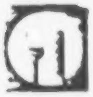
Study the numbered features relation to the legend. Look information about facilities that are new to you. Be prepared to participate in a class discussion.

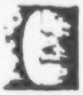

N
21
26
8
30
TERMINAL
RESTAURANT
PILOT CENTER
HANGAR
PARKING LOT
ACCESS ROAD
1 APPROACH LIGHTING SYSTEM
2. LANDING THRESHOLD LIGHTS (GREEN)
3. INSTRUMENT RUNWAY
4 VASI (VISUAL APPROACH SLOPE INDICATOR)
5 BLAST PAD/OVERRUN
6 INSTRUMENT LANDING SYSTEM (ILS) LOCALIZER ANTENNA
7 "HOLD" SHORT LINES
8 RUNUP PAD
9 TAXIWAY
10. DISPLACED THRESHOLD
11. TELEPHONE POLE WITH OBSTRUCTION LIGHTS (RED)
12. PARKING APRON
13 LANDING DIRECTION INDICATORS AND WIND INDICATORS (INCLUDES WIND SOCK AND TETRAHEDRON)
14 RUNWAY LIGHTS (WHITE)
15 TAXIWAY LIGHTS (BLUE)
16. SECURITY FENCE

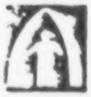
In larger airports, many of the travelers are from foreign countries. Because of the different languages, it is necessary to use symbols to identify services and facilities. Some of these generally used symbols are reproduced below. Make a list on the back of this sheet of symbols you believe should be added to those shown. Then create and draw at least three new symbols taken from your list.

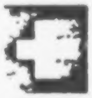

**Gates**

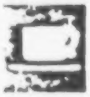

**Washroom**

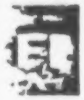

**Restaurant**

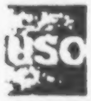

**Telephone Ce**

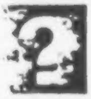

**Security Check**

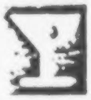

**First Aid**

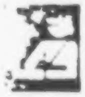

**Coffee Shop**

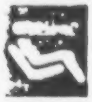

**Flight Insuran**

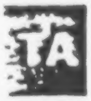

**Military Lounge**

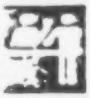

**Airport Information Booth**


**Cocktail Lounge**

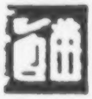

**U.S. Customs**

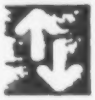

**Rest Area**

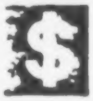

**Travelers Aid**

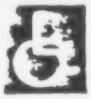

**Ticket Counters**

**U.S. Immigration**

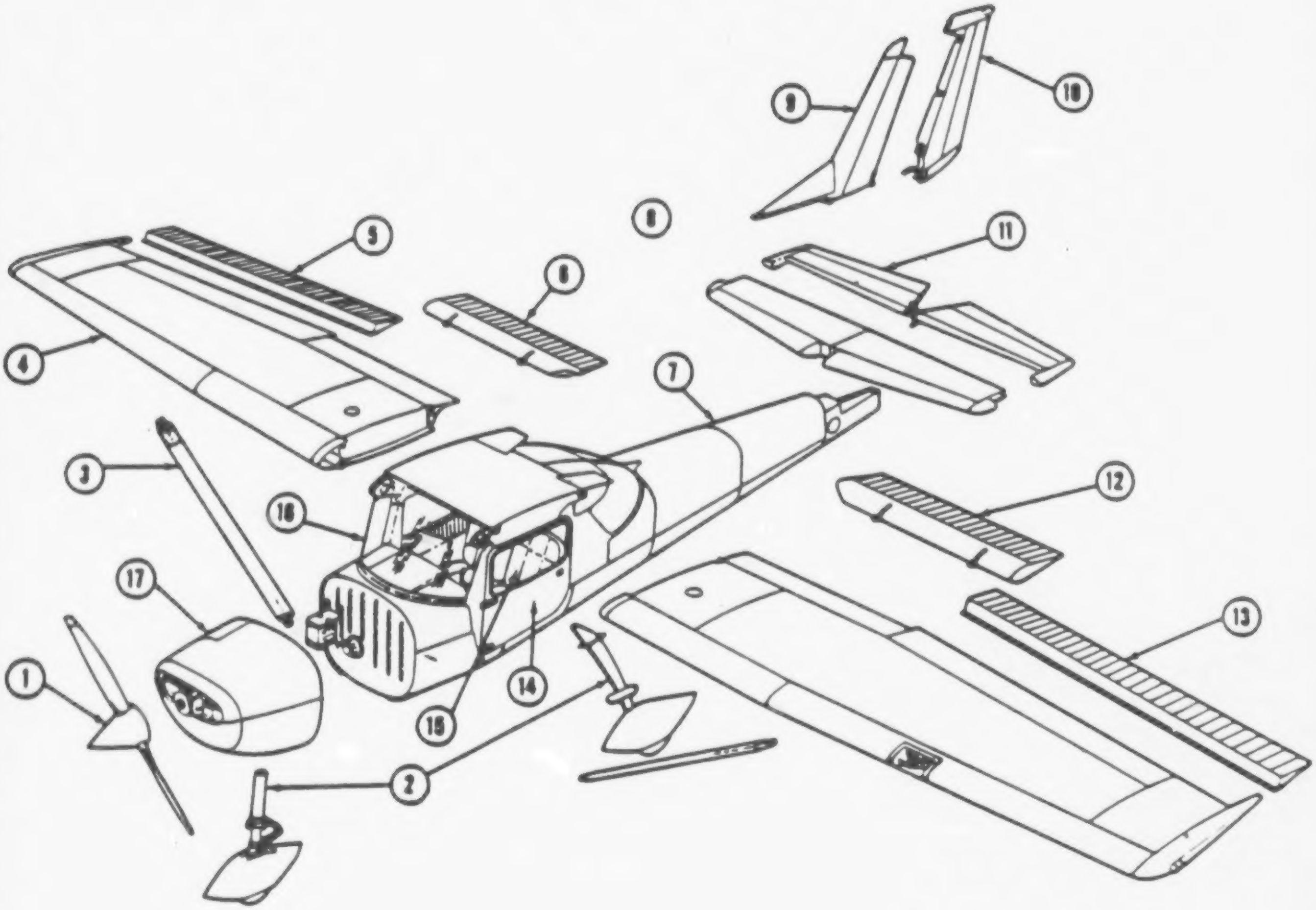

**Gift Shop**


**Elevator**

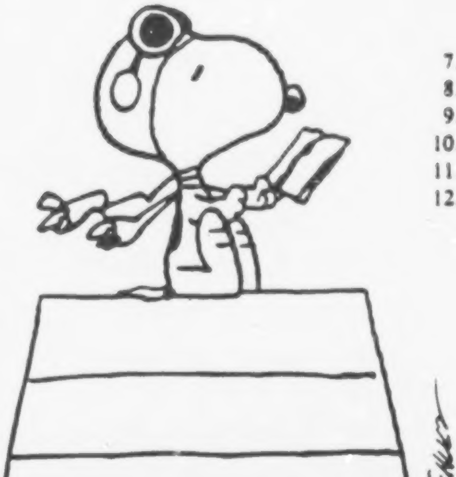

**Foreign Currency**


**Handicapped Parking**

# The Main Parts of an Airplane


10
9
8
5
11
6
4
7
3
16
12
17
13
1
15
14
2

1. Propeller
2. Landing Gear
3. Wing Strut
4. Wing
5. Right Wing Aileron
6. Right Wing Flap
7. Fuselage
8. Horizontal Stabilizer
9. Fin and Dorsal
10. Rudder
11. Elevator
12. Left Wing Flap
13. Left Wing Aileron
14. Door
15. Seat
16. Windshield
17. Engine Cowl

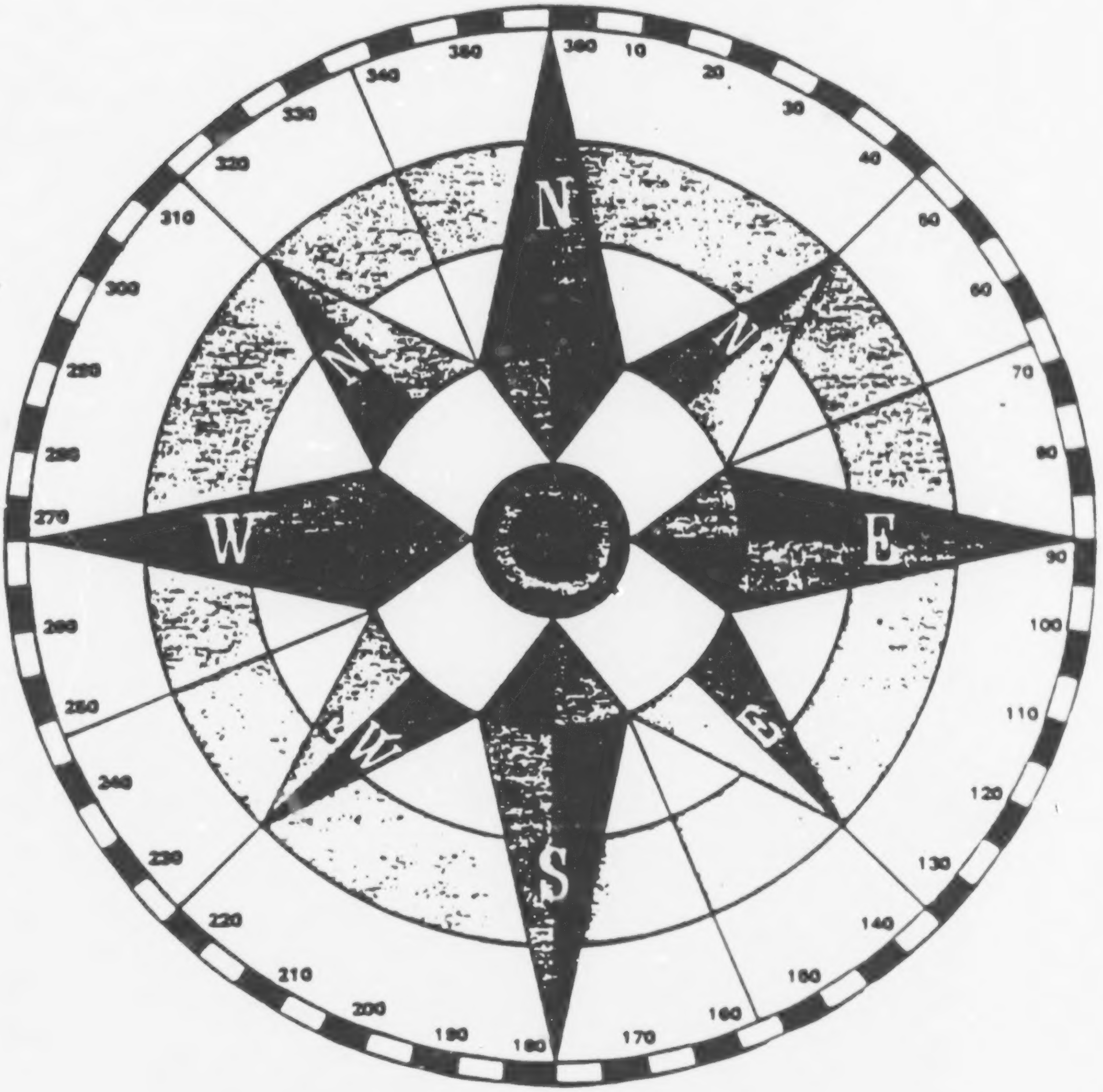


# The Compass Rose Game

### A Suggested Teaching Strategy

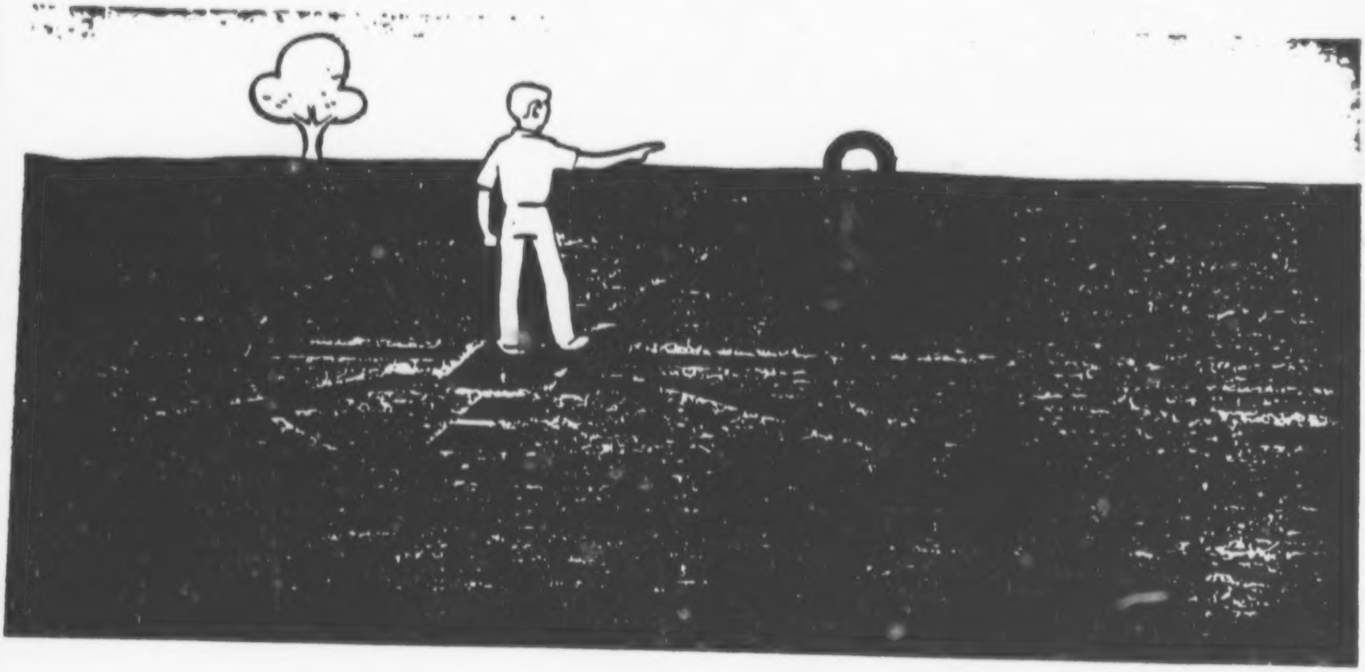
Basic to understanding maps and their application to finding one's way on the earth's surface is a thorough knowledge of the compass. From the ancient mariners to today's private pilots, the compass utilizing the magnetic north pole has been the primary instrument of navigation.

This "game" or activity is designed to help the children gain a basic understanding of cardinal directions in terms of the compass, and to refine that knowledge into understandings of the circle, angles, the great circle routes, and skills in identifying compass directions.



N
NE
E
SE
S
SW
W
NW
360
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230
240
250
260
270
280
290
300
310
320
330
340
350

*The Compass Rose*



*The direction from any given point on the earth's surface to any given point on the earth's surface is always measured as a certain number of degrees from north. One nautical mile is equal to one minute of arc at the equator and all the lines of longitude. Sixty minutes of arc is equal to one degree.*

**The Game**

Draw a large compass rose on a large piece of butcher paper, or draw with chalk directly on the floor. Have north, or 360°, correspond to actual north. Mark the center of the compass rose where a child will stand.

Divide the class into teams, and let each team take turns standing in the compass rose. Members of the other team can call out compass headings from 001° (one degree) to 360° to the child standing in the center of the compass rose, who turns and faces the direction called for. He must turn to his right to be correct, since degrees are counted from north to east to south to west to north.

Variations on this activity can be made to be appropriate to several ability levels. For example, some children can face a given direction and be directed to turn right or left a given number of degrees. If he is facing 035° and is directed to turn left 020°, he will turn left and be facing 015° when the stops. Or he can face 280° and be directed to make a 180° right turn. When he stops he will be facing 100°.

*Note:* In writing compass headings in numbers, one always writes three digits. If the compass heading is from one to nine, it is written 001°, 002°, 003°, etc. For headings over one hundred, no zero is placed before the number, as 180°, 283°, etc.

Orally, these directions, as they may be given to a pilot by a traffic controller on the radio, would be read "zero-zero-three degrees," or "zero-one-five degrees," or "two-seven-zero degrees." Have the children use this terminology in performing the activity.

BEST COPY AVAILABLE

Reprinted by the Federal Aviation Administration with permission from the Cessna Aircraft Company

# Selected Aerospace Topics in Curriculum Context

**how they are built is INDUSTRIAL ARTS**

**who controls them is GOVERNMENT**

**what they cost is ECONOMICS**

**where they land is SOCIAL STUDIES**

**how they fly is SCIENCE**

**who made them fly is HISTORY**

**where they fly is GEOGRAPHY**

### Agriculture

- Aerial photography
- Agricultural aviation
- Australia's aviation
- Crop dusting
- Cloud seeding
- Economic implications
- Food and nutrition
- Infrared radiation
- International Agricultural Aviation Centre
- International Flying Farmers
- Photosynthesis
- Weather
- Weather satellites

### Art

- Balloons
- Commemorative stamps and medals
- De Vinci, Leonardo
- History of aviation
- Insignia
- Interiors of aircraft
- Kites
- Medals and decoration
- Model aircraft
- Mythology
- Objects of art
- Photography
- Pilot and crew wings
- Science fiction
- Trophies and awards

### Astronomy

- Asteroids
- Astronautics
- Astronomy
- Astrophysics
- Celestial mechanics
- Celestial sphere
- Comets
- Constellations
- Cosmic rays
- Eclipse
- Galaxies
- International Years of the Quiet Sun
- Interplanetary travel
- Kepler's law
- Light
- Mariner probes
- Meteors
- Moon
- Observatories
- Orbiting observatories
- Orbits and trajectories
- Planetariums
- Planets
- Quantum theory
- Quasar
- Radio astronomy
- Relativity theory
- Solar system
- Stars
- Sun
- Telescopes
- Ultraviolet
- Universe
- X-rays

### Biology

- Animals in space
- Aviation medicine
- Biosatellites
- Bird flight
- Circadian rhythm
- Closed ecological system
- Extraterrestrial life
- Hydroponics
- Kosmos satellites
- Photosynthesis
- Space biology

### Business Law

- Airports
- Certification procedures
- Crash investigation
- Government contracts
- Insurance
- Legal implications
- Patents
- Police and fire services
- Registration of aircraft

### Career Guidance

Air traffic control
Army aviation
Astronauts
Careers
Charter flying
Cryogenics
Crystallography
Cybernetics
Flight instruction
General aviation
Government in aerospace
Ground service and maintenance
Manufacturing
Occupations
Pilots and pilot certificates
Pilot training
Spacecraft design
Stewards and stewardesses
Test pilots
Women in aerospace

### Chemistry

Air
Alloys
Atoms
Atmosphere
Chemical energy
Closed ecological system
Cryogenics
Elements
Fuels
Gases
Lubricants
Propellants
Specific gravity

### Earth Science

Air masses
Applications Technology Satellites
Astrogeology
Astronautics
Astronomy
Astrophysics
Atmosphere
Aurora
Aviation weather
Boyle's law
Charts
Compasses
Density altitude
Discoverer program
Earth
Environmental research satellites
Explorer satellites
Geodetic satellites
Gravity
Greenhouse effect
Kosmos satellites
Latitude and longitude
Lightning
Lunar charts
Magnetic course
Maps and mapping
Mariner probes
Meteorology
Navigation systems
Navigation techniques
Oceanographic research
Orbiting observatories
Pilotage
Precipitation
Ranger
Sounding rockets
Surveyor
Van Allen belts
Weather
Weather maps and charts
Weather satellites

### Economics

Aerospace industry
Airports
Bush flying
Business aviation
Cargo aircraft
Commercial airlines
Commercial air transports
Crop dusting
Economic implications
Fixed base operator
Flight simulators
General aviation
Government contracts
Government in aerospace
Jet aircraft
Jumbo jets
Manufacturing
Production techniques
Program management
Supersonic transports
Utility aviation

### General Science

Airplane
Astronomy
Atmosphere
Atoms
Barometric pressure
Bernoulli's principle
Bird flight
Clouds
Electricity
Energy
Engines
Fog
Galaxies
Helicopters
Jet aircraft
Launch vehicles
Man in flight
Matter
Mercury program
Photography
Planets
Radio communications
Satellites
Saturn rockets
Space stations
Stars
Sun
Walk in space
Weather
Weather satellites

### Geography

Bush flying
Cartography
Charts
Compasses
Course plotting
European aerospace activities
Latitude and longitude
Magnetic course
Maps and mapping
Photography
Photogrammetry
U.S.S.R. aerospace activities

### Geology

Astrogeology
Geodetic satellites
Mountain, desert, and jungle flying
Photogrammetry
Ranger
Surveyor

### Government

Aerospace industry
Air Commerce Act
Air traffic control
Apollo
Army aviation
Civil Aeronautics Board
Coast Guard aviation
Crash investigation
FAA
Federal Aviation Regulations
Flight service station
Government contracts
Instrument Flight Rules
Marine Corps aviation
Mercury program
Military aviation
Military space program
NASA
National Airspace System
Naval Aviation
Pilots and pilot certificates
Registration of aircraft
Visual Flight Rules

### Health

Aerospace medicine
Animals in space
Astronauts
Circadian rhythm
Drug effects
Environmental control systems
Flight physical
Food and nutrition
Human engineering
Hypoxia
Life-support systems
Man in flight
Manned spaceflight
Man-powered flight
Pressurization
Sensory deprivation
Spacesuits
Temperature control
Weightlessness

© 1965 United Feature Syndicate, Inc

BEST COPY AVAILABLE

### History

- Ace
- Air Commerce Act
- Air raid
- Altitude records
- Autogiros
- Balloons
- Barnstormers
- Battle of Britian
- Biographies
- Bomber aircraft
- Bush flying
- Commemorative stamps and medals
- Dirigibles
- Distance records
- Endurance records
- First World War aircraft
- Flying Circus
- Gliders
- History of aviation
- Korean War
- Luftwaffe
- Man-powered flight
- Mythology
- National Advisory Committee for Aeronautics
- Rheims Air Meet
- Science fiction
- Second World War aircraft
- Speed records
- Women in aerospace
- World War I
- World War II

### Home Economics

- Fabrics
- Food and nutrition
- Interiors of aircraft
- Spacesuits
- Stewards and stewardesses

### Industrial Arts

- Aerial photography
- Aircraft propulsion system
- Avionics
- Electronics
- General aviation aircraft
- Generators and alternators
- Interiors of aircraft
- Manufacturing
- Materials
- Metals and metallurgy
- Occupations
- Preventive maintenance
- Production techniques
- Refueling
- Spacecraft design

### International Relations

- Air defense systems
- Air forces of the world
- Berlin airlift
- Commercial airlines
- DEW line
- Federation Aeronautique Internationale
- Five Freedoms
- International agreements
- International Geophysical Year
- International projects
- Israeli-Arab Conflict 1967
- Missiles
- Political implications
- Reconnaissance
- Space law
- Tracking systems and networks
- United Nations

### Mathematics

- Binary numbers
- Celestial navigation
- Course plotting
- Cybernetics
- Dead reckoning
- Doppler navigation
- Escape velocity
- Information systems
- Navigation techniques
- Orbits and trajectories
- Parabola
- Telemetry
- Weight and balance

### Medicine

- Acceleration
- Aerospace medicine
- Animals in space
- Astronauts
- Aviation medicine
- Circadian rhythm
- Closed ecological system
- Decompression
- Drug effects
- Environmental control systems
- Environmental simulators
- Escape systems
- Flight physical
- High-altitude flight training
- Human engineering
- Hypoxia
- Life-support systems
- Man in flight
- Manned spaceflight
- Mercury program
- Parachutes
- Pressurization
- Psychological factors of flight
- Re-entry vehicles
- Sensory deprivation
- Space biology
- Spaceflight training
- Space medicine
- Spacesuits
- Technological projections
- Walk in Space
- Weightlessness
- X-rays

### Meteorology

- Air
- Air masses
- Atmosphere
- Barometric pressure
- Clouds
- Convection currents
- Earth science
- Evaporation and condensation
- Fog
- Humidity
- Precipitation
- Turbulence
- Weather maps and charts
- Weather satellites
- Wind

### Physics

- Acoustics
- Aerodynamics
- Aircraft propulsion systems
- Airfoil
- Airplane
- Airspeed indicator
- Alloys
- Area rule
- Astronautics
- Attitude control
- Automatic landing
- Avionics
- Bank
- Bearing
- Bernoulli's principle
- Boyle's law
- Carburetion

AVIATION
IS
FUN

© 1965, 1966 United Feature Syndicate, Inc

Center of gravity
Computers
Cryogenics
Crystallography
Doppler effect
Dynamic soaring
Electricity
Electromagnetism
Electronics
Energy
Engines
Escape velocity
Flight management
Fluid mechanics
Gas turbine engines
Ground-effect machines
Gyroscope
Heat energy
Heat shields
High-lift devices
Hydraulic systems
Hypersonic flight
Inertial guidance
Infrared radiation
Instrument panel
Lasers
Launching
Lifting-body vehicles
Maneuvers
Matter
Measurement of power
Metals and metallurgy
Newton's laws
Noise
Nuclear energy
Nuclear propulsion
Pilot-static system
Plasma
Power management
Radar
Radiation
Radio
Reciprocating engines
Rendezvous and docking
Robots
Rotating combustion engines
Sailplanes
Semiconductors
Shock wave
Solar wave
Solid-state physics
Space propulsion systems
Supersonic flight
Television
Temperature scales
V / STOL aircraft
Wind tunnels
Wings
X-rays

### Psychology

Astronauts
Aviation medicine
Cosmonauts
Flying safety
Gemini
Man in flight
Pilot training
Psychological factors of flight
Spaceflight training
Space medicine

### Social Studies

Air defense systems
Air forces of the world
Airmail
Air taxis
Apollo
Army aviation
Atlas missile
Berlin airlift
Biographies
Blockhouse
Bombs
Careers
Cargo aircraft
Commercial airlines
Communications satellites
Crop dusting
Cybernetics
Demonstration teams
DEW line
Economic implications
Educational implications
European aerospace activities
Eurospace
Fighter aircraft
Fixed base operation
Flight (as passenger)
Flight test programs
Flying doctor services
Forest fire control
Gemini
General aviation
Gliders
Gliding
Government in aerospace
Hangars
Helicopters
Heliports
High-speed surface transportation
History of aviation
Homebuilt aircraft
Instrument flight techniques
Insurance
Interplanetary travel
Israeli-Arab Conflict—1967
Jet aircraft
Jumbo jets
Kamikaze
Kennedy Space Center
Korean War
Launch facilities
Launch vehicles
Luftwaffe
Lunar bases
Lunar exploration
Manned Orbiting Laboratory
Manned spaceflight
Manufacturing
Mercury program
Military aircraft
Military implications
Military space program
Missiles
Mythology
NASA
Naval aviation
NORAD
Oceanographic research
Peenemunde
Polar flights
Police and fire services
Preflight training
Production techniques
Program management
Radio communications
Rescue and recovery service
Rockets and rocketry
Runways
Safety statistics
Sailplanes
Satellites
Saturn rockets
Search and rescue
Social implications
Space stations
Sport flying
Strategic Air Command
Supersonic transports
Systems engineering
Technological projections
Unidentified flying objects
U.S.S.R. aerospace activities
Utility aviation
Weaponry
Wind tunnels
X-series aircraft

### Speech and Communications

Air traffic control
Communications satellites
Ground control approach
Morse code
Phonetic alphabet
Terminology of aerospace

U.S. Department
of Transportation

**Federal Aviation**
**Administration**

CHOP CHOP
CHOP

© 1958, 1965 United Feature Syndicate, Inc.

Special thanks to Charles Schulz, who, with his globally acknowledged creative genius, and his own personal "aviation awareness," provided the use of his "Peanuts Gang" in this document. Without his generous contribution of time and talent, this publication would not have been possible.

# A Flying Start

## Primary Missions of the FAA

- To regulate air commerce in a way that will promote its development and safety while fulfilling the requirements of national defense.
- To control the use of navigable airspace and regulate both civil and military operations in the interest of safety and efficiency.
- To promote and encourage the development of civil aeronautics.
- To install and operate air navigation facilities and to consolidate research and development related to these facilities.
- To develop and implement programs and regulations to control aircraft noise, sonic boom, and other environmental effects of civil aviation.

generally consist of a group of aviation enthusiasts who collectively own aircraft and may have certificated instructors available to instruct club members.

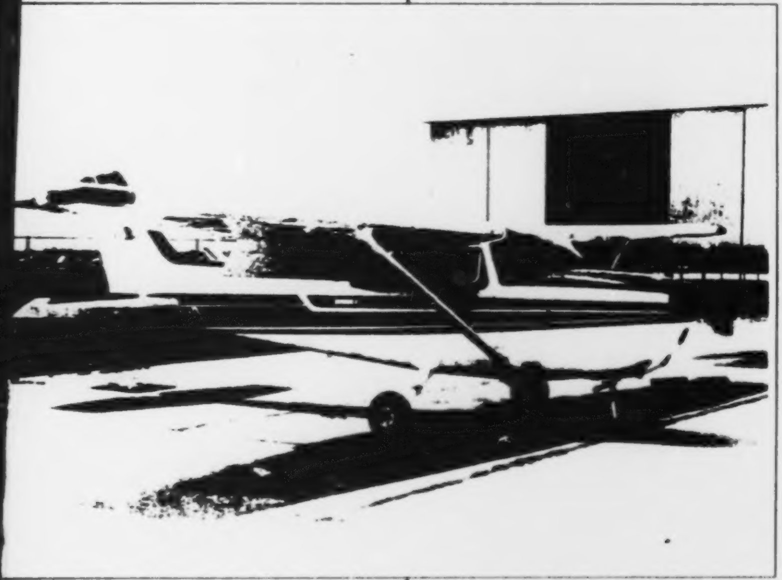
## What Will My Flying Lessons Be Like?

When the time comes for you to start, you will undoubtedly begin flying in a single engine, two-place training aircraft. Since there are no other requirements to fulfill before your first lesson, you may start flying as soon as you decide to go ahead and learn.

Right from the beginning you will do most of the actual flying. From takeoff and climbout to turning the aircraft, your instructor will allow you to do most of the flying. At first you will try a straight and level course, keeping the wings level and the nose of the plane at just the right spot on the horizon.

As your lessons continue, you will start to make gentle turns and then gradually steeper and steeper ones. You will find out what glides and climbs feel like and what stalls are all about. Following several lessons, you will start making takeoffs and landings while you continue to practice other maneuvers.

Eventually the day will come when you are ready to fly the plane all alone on your unforgettable first solo flight. The plane will perform better than ever before. It may climb out faster than before, and you may have to level off at the correct altitude, usually at 1,000 feet above ground in the "pattern" around the airport, sooner than before. At first you might think that it is your imagination, but it is not. In fact, you are flying without your instructor's weight, and in a small aircraft, this can make a noticeable difference in aircraft performance.



BEST COPY AVAILABLE

As you turn into the final approach for your first landing, you may feel a little apprehensive, but as you line up with the runway, you'll start doing what you've been trained to do automatically. Your concentration may be so intense that it may not be until you have taxied off of the runway that you stop to think about what you've done and how smooth it was.

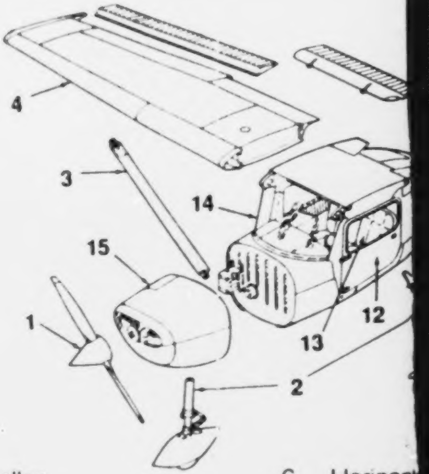
The first solo is a milestone in your training. You are on your way, but you still have a lot of flying and studying to do before you get your pilot certificate.

### *How Long Does It Take To Get a Private Pilot Certificate?*

This depends upon how much time you can dedicate to flying. Many people try to average three or four hours a week of flight training, but if financial or time constraints do not permit this, all is by no means lost. Flying is supposed to be fun — don't think that you have to adhere to a strict schedule each week, but the more time you can put in, the more familiar and confident you become with how the aircraft operates. The FAA requires that you have at least 30 hours of flight time for a recreational pilot certificate, and at least 40 hours for a private pilot certificate, but most people have more.

After starting your solo flights, most of the remainder of your time will be spent improving the maneuvers you have learned and practicing takeoffs and landings. The maneuvers teach you to understand what your aircraft can and cannot do. The instructors teach you all about positive control of the airplane and how to maintain it. After you have passed a written examination and your

**The Main Parts of an Air**



Courtesy Cessna Aircraft Company

1. Propeller
2. Landing Gear
3. Wing Strut
4. Wing
5. Fuselage

6. Horizont
7. Fin and
8. Rudder
9. Elevator
10. Left Wing

BEST COPY AVAILABLE

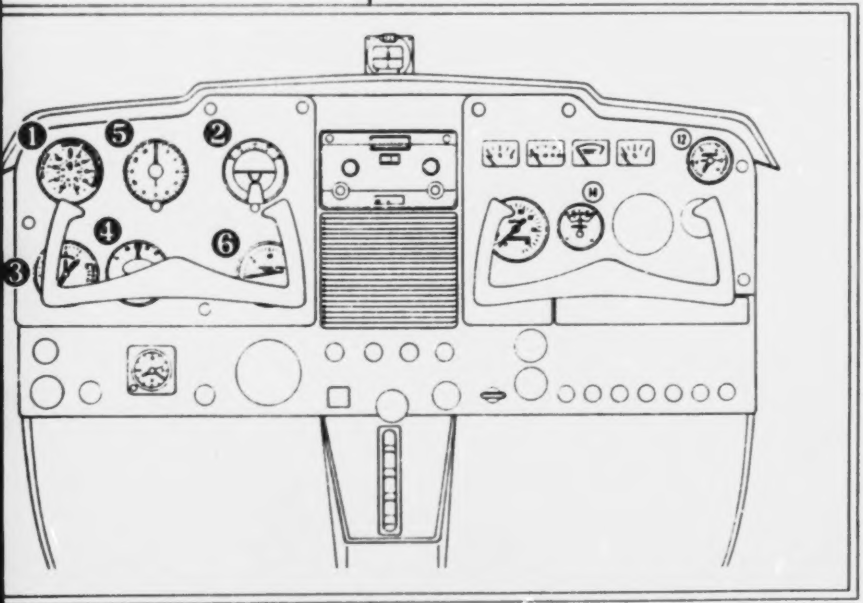
Although the cockpit may seem confusing at first, most aircraft have six basic instruments to aid the pilot during flight.

❶ Airspeed indicator: This instrument shows how fast the aircraft is travelling through the air.

❷ Attitude Indicator: This instrument functions as an artificial horizon. It shows whether the plane is banking to the left or right and if the nose is above or below the horizon.

❸ Altimeter: This instrument is a function of barometric pressure and shows the altitude in feet above mean sea level.

❹ Turn coordinator: This instrument features a miniature airplane inside the dial and gauges the turn rate and direction of the aircraft. By using the turn indicator, you can complete a standard rate 360 degree turn in exactly two minutes.



❺ Heading indicator: This instrument is a directional gyro (DG) and functions as a compass to indicate the current heading of the aircraft.

❻ Vertical speed indicator: This instrument measures the change in air pressure as the aircraft ascends or descends and registers the change in feet per minute.

## *Is It as Easy as It Seems?*

It's as easy as that  Once you have your pilot certificate, the sky's the limit! You can continue your training to get your instrument rating  If you have received flight training for night flying, then you can fly at night  An instrument rating is not required to fly at night except under certain conditions for a commercial pilot  (A recreational category pilot cannot fly at night under any circumstances unless he or she is with an instructor ) From there you can go on and learn how to fly seaplanes or multiengine aircraft  The more experience you have, the more potential there is to become an air transport pilot and carry passengers to new and exciting places or become a certified flight instructor and teach other people the wonders of flying  When you begin your pilot's lessons you have opened a whole new world and gotten off to *A FLYING START*

For more information on how to get your pilot's certificate, call or write your local FAA Flight Standards District Office, found in the telephone book under "United States Government, Department of Transportation – Federal Aviation Administration."

BEST COPY AVAILABLE

decreases As the wing separates the airflow, it creates an area of decreased pressure above the wing as compared to the air pressure below the wing The pressure differential between the upper and lower portions of the wing is the primary source of lift

WEIGHT is the opposing force of lift and is caused by the Earth's gravitational pull on the aircraft and its contents When enough lift is generated to overcome gravity, the aircraft becomes airborne

THRUST is the forward acting force that propels the aircraft As the amount of thrust is increased, speed and lift are generated On most training aircraft, a single engine provides the necessary thrust to move the plane Larger aircraft, however, may have two or more engines or even jet engines

DRAG is the deflection or impediment of smooth airflow of air around the aircraft Drag functions in the opposite direction of thrust As thrust increases, the drag of the aircraft also increases and eventually limits the speed of the aircraft When thrust is greater than drag, the aircraft is accelerating; conversely, when drag exceeds thrust, the plane's speed is decreasing.

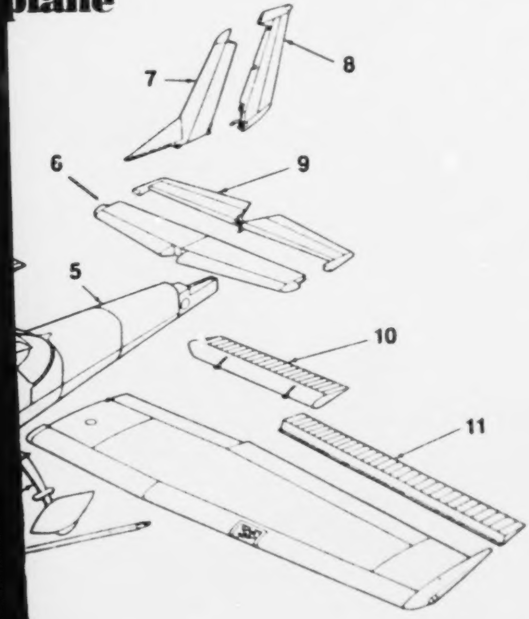
The aircraft's movement is controlled by the pilot using the yoke (similar to a three-dimensional steering wheel) and foot, or rudder, pedals

The yoke turns left and right, as well as moving backward and forward Turning the yoke to the left or the right causes the ailerons on the wings to move up and down For instance, turning the yoke to the left causes the left aileron to go up and the right to move down As this occurs, the right wing generates more lift and the right wing moves upward, and the left wing goes down The result is the plane rolls to the left

Up-and-down movement is created by pulling or pushing the yoke Pulling the yoke toward you raises the elevator on the tail, which pushes the tail down and the nose up, placing the aircraft in a climb altitude Conversely, as you push the yoke forward, the elevator lowers, raising the tail and pushing the nose downward

The foot pedals control the rudder movement on the tail of the aircraft Pressing the right rudder pedal moves the tail to the left and the nose to the right The rudder and the ailerons are used in conjunction to produce a smooth coordinated turn instructor believes that you have had enough instruction, you will finally be prepared to take the flight test with an FAA designated pilot examiner. As you fly, the examiner will evaluate your ability to control the aircraft at all times: in other words, your ability to fly safely. If you are applying for a private pilot certificate, you will also be tested on your radio procedures and your use of navigational equipment. These are the determining factors which will be scrutinized to determine whether you meet the standards for a pilot certificate.

**plane**



al Stabilizer
Dorsal
Flap

11. Left Wing Aileron
12. Door
13. Seat
14. Wingshield
15. Engine Cowl

## How Safe Is Flying a Small Airplane?

As your time flying an airplane increases and you become more familiar with how the aircraft works, you will find that general aviation aircraft are very safe in the hands of a competent pilot. The construction of these planes adheres to strict safety regulations imposed by the FAA. In addition, the airplanes are frequently inspected by qualified mechanics and periodically checked by FAA inspectors.

## Why Does an Airplane Fly?

There are four basic forces that act upon an airplane during flight: lift, weight, thrust and drag.

LIFT is generated by the wings, which function as airfoils. An airfoil is any surface such as a wing, which provides aerodynamic force when it interacts with a moving stream of air. The wings on an airplane have more camber, or curvature, on the upper portion than the lower portion, which causes the air to flow more quickly over the top of the wing. One of the primary laws of lift comes from Bernoulli's Principle, which states that as the velocity of a fluid (in this case air) increases, its pressure

BEST COPY AVAILABLE

## *What Do I Need To Fly in the United States?*

To fly in the United States as an FAA certified pilot, you must pass both a practical test and a written test and meet three requirements. First, you must be at least 16 years of age to solo and 17 to get an airplane or rotorcraft pilot certificate. (Glider and balloon pilots must be at least 14 years old to solo, 16 years old to get the pilot certificate, and do not have to have an FAA medical certificate.) Second, you must pass a physical examination from an FAA designated doctor. And third, you must be able to speak, read, and understand English, the international language of aviation. This last requirement is important because all air traffic control flight instructions are transmitted in English, as is other vital flight information.

## *How Hard Is It To Learn To Fly?*

In order to get your pilot certificate, you must complete two types of instruction: ground training and flight training.

Ground training teaches you the principles of flight, aircraft systems and performance, meteorology and weather patterns, navigation, radio communications, and flight planning.

Flight training begins with lessons in a training aircraft with a flight instructor, and when he or she feels you are qualified you will make your first solo flight. This is where all the knowledge you have accumulated in ground training gets put into practice. Although it is not necessary to go to ground school before beginning flight training, it is a good idea to have fundamental knowledge of the general principles of flight.

## *How and Where Can I Learn To Fly?*

There are FAA certificated instructors at most, if not all, small airports. "Fixed Based Operators," or FBO's, as they are called, are aviation businesses located at airports. They provide a variety of services such as aircraft rental, storage, fuel, repairs, and ground and flight instruction (FAR Part 61). FBO's are not employed by the FAA, but some have pilot schools that have been certificated by the FAA to provide flight instruction under FAR Part 141.

Another alternative is to join a flying club in your area. Local flying clubs can provide services similar to FBO's. The clubs

## *Would You Like To Fly?*

Learning may not be as hard as you think. In fact, each year thousands of people from all walks of life learn to fly. Today there are more than 700,000 active pilots in the United States. Of these, more than 450,000 are general aviation pilots— a figure that does not include military or air carrier pilots— and most of these pilots hold a private or recreational pilot's certificate which is the first goal of the student pilot.

Some pilots continue their training to get an instrument rating or additional certificates, such as flight instructor, commercial pilot, or even airline transport pilot. However, most people are content with a private pilot certificate which permits them to fly themselves and non-paying passengers virtually anywhere they want in good weather. Another alternative is a recreational pilot certificate which allows the pilots to fly within fifty nautical miles of the base airport.

Many pilots fly just for the sheer joy of flying, while others fly because it is an independent, fast, convenient form of transportation. Instead of driving or being tied down to public transportation schedules, they fly on business, vacations, or any other trips they wish to make.

The rental plane is a boon to the general aviation pilot. Pilots do not need the cash to buy their own planes in order to fly. With a recreational or private pilot certificate, pilots may rent planes at most airports. In fact, of the approximately 35 million general aviation hours flown each year, the majority are flown in rented aircraft.

So that's the general picture. Now, if YOU want to fly, here are answers to a few commonly asked questions.

US Department
of Transportation

**Federal Aviation
Administration**

Postage and Fees Paid
Federal Aviation
Administration
DOT 515

U.S.MAIL

# AVIATION CAREERS SERIES

## *YOUR CAREER IN AVIATION: THE SKY'S THE LIMIT*

U.S. Department of Transportation
**Federal Aviation Administration**
Office of Public Affairs
Aviation Education Program

PA 120-91

BEST COPY AVAILABLE

US Department
of Transportation
**Federal Aviation
Administration**

# INTRODUCTION

Aviation has progressed a long way since the 120-foot flight by Orville Wright on December 17, 1903, at Kitty Hawk, North Carolina, and since the first U.S. airline began operating between Tampa and St. Petersburg, Florida, on January 1, 1914. Today supersonic aircraft fly routinely across the oceans, and more than two million people are employed in aviation, the aerospace and air transportation industries.

In response to its Congressional mandate, the Federal Aviation Administration, as part of its effort to plan for the future of air transportation, conducts an Aviation Education Program to inform students, teachers, and the public about the Nation's air transportation system.

Aviation offers many varied opportunities for exciting and rewarding careers. The purpose of this brochure, and others in the FAA Aviation Careers Series, is to provide information that will be useful in making career decisions. Publications in this series include:

1. *Pilots & Flight Engineers*
2. *Flight Attendants*
3. *Airline Non-Flying Careers*
4. *Aircraft Manufacturing*
5. *Aviation Maintenance and Avionics*
6. *Airport Careers*
7. *Government Careers*

There is also a brochure entitled *"Women in Aviation."*

Free brochures may be obtained by sending a self-addressed mailing label with your request to: Superintendent of Documents, Retail Distribution Division, Consigned Branch, 8610 Cherry Lane, Laurel, MD 20707.

# ACKNOWLEDGEMENT

The FAA wishes to thank Keith Connes, and Barbara de Boinville for their contributions to this publication.

# FAA
# AVIATION EDUCATION PROGRAM

The Federal Aviation Administration (FAA) has a rich history of dedication and commitment to aviation education. The Congress has recognized this historic leadership role by requiring a civil aviation information distribution program within each FAA region to support the agency's aviation education program.

Aviation education is an integral element of the agency's mission and is essential to carrying out its responsibilities of promoting aviation and flight safety.

The agency is dedicated to the development and implementation of aviation education programs which provide general education for all citizens and information on aviation careers for America's young people with a special emphasis on women and minority youth.

# TABLE OF CONTENTS

Pilots and Flight Engineers .......... 1

Flight Attendants .......... 1

Airline Non-Flying Career .......... 2

Aircraft Manufacturing .......... 4

Aviation Maintenance and Avionics .......... 4

Airport Careers .......... 5

Government Careers .......... 6

The Federal Aviation Administration .......... 6

U.S. Military Services .......... 8

Other Federal Government Departments and Agencies .. 8

State Aviation Jobs .......... 8

Women in Aviation .......... 9

Aviation Education Officers .......... 9

Aviation Education Resource Centers .......... 10

# YOUR CAREER IN AVIATION: THE SKY'S THE LIMIT

## YOUR CAREER IN AVIATION: THE SKY'S THE LIMIT

For someone who is looking for a career that offers a tradition of service, growth, and excitement, the world of aviation beckons.

It's a big world, and one that is made up of a wide variety of job opportunities. Some require a considerable amount of training, while others are available at the entry level.

Depending on the kind of working environment you prefer, you may find yourself aloft in the cockpit or cabin of a plane or on solid ground in an office, on a production line, or on an airport ramp.

This brochure will provide you with an overview of the job categories mentioned on the opening page.

## PILOTS AND FLIGHT ENGINEERS

**Pilots.** For many professional pilots, the ultimate job is to be an airline captain. The pay can be very good; top salary at some of the higher paying major airlines is around $160,000 a year, for about 80 to 85 hours of flying per month. And benefits for pilots, as well as many other airline employees, include travel passes. But remember, the top salary level is reached only after many years of service and only at a few of the major airlines. Most airline pilots start out as first officer (co-pilot) with a regional carrier; initially they earn about $12,000 to 18,000 a year. And when they join a major airline, their first position may not be as a pilot, but as a flight engineer. Considerable training is necessary for any type of pilot job, and most airline pilots have to "pay their dues" by first gaining a good deal of experience either in the military or in other types of civilian piloting. In addition to airline pilot, pilot jobs include flight instructor, corporate pilot, charter pilot, test pilot, and agricultural pilot. Many people enjoy these kinds of flying—each with its own set of challenges and rewards—and wouldn't think of trading their jobs for that of airline pilot.

**Flight Engineers.** The position of flight engineer, or second officer, exists only on some of the large jet planes. Smaller airliners—as well as the newest large aircraft—have only a two-person flight crew, consisting of the first officer and captain. Functions of the flight engineer include inspecting the aircraft and overseeing fueling operations before flight. During the flight, the flight engineer monitors the performance of the engines and cabin pressurization, air conditioning, and other systems. Some flight engineers are not pilots and remain in their position for their entire careers, while others become flight engineers strictly as a stepping stone to a "front row seat" as airline pilot.

For more information on these career opportunities, request the Aviation Careers Series brochure entitled "Pilots and Flight Engineers."

## FLIGHT ATTENDANTS

While the flight crew in the cockpit is responsible for getting the passengers to their destination safely and comfortably, the flight attendants are in charge of the cabin, and they, too, are responsible for the safety and comfort of the passengers.

The flight attendant's normal routine is to see that the passengers are seated properly and to serve refreshments or meals during the flight. However, the attendants are highly skilled in handling emergencies if they should arise, and over the years many of them have honored their profession with heroic service.

Flight assignments usually require overnight stays in cities away from home base. Flight attendants are given hotel accommodations and travel allowances for meal expenses and transportation.

In addition to performing flight duties, flight attendants sometimes make public relations appearances for the airlines during "career days" at high schools, at fund raising campaigns, sales meetings, conventions, and other goodwill occasions.

As for advancement, they can become senior flight attendants or flight attendant supervisors, directing other flight attendants on the flight. Also they may work into positions as flight attendant instructors, or other attractive jobs in the company.

For more information on these career opportunities, request the Aviation Careers Series brochure entitled "Flight Attendants."

## AIRLINE NON-FLYING CAREERS

Even though the airlines are in business to transport people from one place to another, they could not function without the help of many people on the ground, including those who take reservations and sell tickets, as well as those who help keep the airplanes operating on schedule.

In general, most airline jobs require a high school diploma. All workers, regardless of their jobs, are given some degree of on-the-job training. Some private technical schools offer courses in airline operations (such as reservations, ticketing, teletypist and flight attendant training). This training may give an applicant an advantage, but remember that each airline has its own training procedures. Therefore, you should check with the airline to which you are applying to find out what pre-employment training it requires.

Briefly described below are many of the jobs that must be filled to keep the planes flying.

**Instructor.** The airlines' excellent safety record is largely because of the first-rate training they provide. To keep up the proficiency of flight crews and ground personnel who have direct contact with the airplanes, powerplants, and flight techniques, the airlines employ several thousand people. Typical training jobs are ground school instructor, flight attendant instructor, and flight simulator/duplicator operator. The instructors direct the pre-service and in-service training programs of the airline. Educators are also employed as curriculum/program developers.

**Engineer.** In line with their particular engineering specialty, engineers work closely with aircraft manufacturers to develop new models of airliners. They make sure the requirements of the airline are met concerning performance, aircraft accessories, cabin plan, interior decorations, and extra equipment. They also design improvements to aircraft and to methods of servicing and overhauling them.

**Flight Dispatcher.** In cooperation with the pilot, the flight dispatcher furnishes a flight plan that enables the aircraft to arrive at its destination on schedule with the maximum payload (that is, passengers, mail, cargo) and the least operating cost. The flight dispatcher considers enroute and destination weather, winds aloft, alternate destinations, fuel required, altitudes, and traffic flow. He or she maintains a constant watch on all flights dispatched and is the liaison between the pilot and ground service personnel. The flight dispatcher must be familiar with all airline routes and airport facilities as well as with the takeoff, cruising, and landing characteristics of all types of aircraft operated by the airline. Flight dispatchers also take periodic flights in the cockpit with the flight crew to observe flight routes, conditions, and airports.

**Meteorologist.** The meteorologist analyzes weather data and prepares weather reports for the flight dispatcher, pilots, and other airline personnel concerned with weather information. He or she assists the flight dispatcher in preparing flight plans.

**Schedule Coordinator.** The schedule coordinator keeps track of the whereabouts of aircraft and crews; receives and relays reports of delays due to weather and mechanical problems; estimates times of arrival; and gives orders for substitution of aircraft when required. The schedule coordinator may be involved in the diversion of flights to alternate airports, and with seating arrangements of planes.

**Station Manager or Agent.** Sometimes known as the district operations manager, the station manager or agent is responsible for all flight and ground operations, such as aircraft handling, passenger services, and air cargo operations. At a small station, the manager may sell tickets, make public announcements, check in baggage, move portable boarding stairs, prepare passenger and air cargo manifests, operate teletype machines and computer terminals, and perform other needed services.

**Reservations Sales Agent.** The reservations sales agent handles telephone inquiries about flight schedules, fares, and connecting flights, and he or she reserves seats and cargo space for customers. The reservations sales agent must be able to operate computerized reservations equipment, keep records of reservations, and recommend services that fit customers' requirements.

**Ticket Agent.** The ticket agent answers inquiries about flight schedules and fares, verifies reservations by phone, figures fares, writes tickets, and handles payments. Agents who work at an air terminal ticket counter may check in passengers' baggage.

**Ground Attendant.** High public visibility characterizes this job. The ground attendant assists passengers in the terminal in many different ways. For example, the ground attendant answers questions about fares, helps locate lost baggage, explains missed connections, and provides assistance to persons who are ill or in need of a wheelchair.

**Teletypist.** The teletypist operates teletype machines that send, receive, and distribute messages. He or she works in the airline's operations office or in other offices where teletype equipment is used.

**Skycap.** The skycap helps passengers with baggage and answers questions about departures, arrivals, and terminal facilities. Skycaps assist passengers to and from taxis, buses, and cars, and sometimes they check in baggage at the terminal entrance.

**Air Freight Agent.** Air freight agents receive air freight shipments, supervise loading and unloading, and keep written records. They handle contacts with air freight forwarders and customers, and they use telephones, computers, and hand calculators to do their jobs.

**Passenger Service Agent.** The passenger service agent responds to passengers needing special assistance because of over-sold flights or missed connections, for example. He or she may help with the boarding or deplaning of passengers and also may perform the duties of ticket agent.

**Sales Representative.** The sales representative, sometimes referred to as an account executive, calls on prospective customers to explain the advantages of airline service for travel and shipment of cargo. He or she keeps in touch with travel agencies, firms, and educational institutions that may need airline services, and with other airlines to increase interline sales. Hotel reservations for customers are sometimes made by sales representatives. A knowledge of flight and fare schedules is essential.

**District Sales Manager.** The district sales manager is in charge of the city ticket and reservations sales offices in the area. To promote air traffic and sales of airline seats and cargo space, the sales manager maintains contacts with many prospective customers and directs the activities of sales personnel.

**Ramp Service Personnel.** There are various types of ramp personnel. *The cabin serviceperson* cleans the airplane and cockpit between flights. Particular duties include vacuuming the floor, picking up trash, washing lavatories and buffets, replacing headrests and pillow covers, folding blankets, refilling seat packets with magazines and safety information, refilling the drinking water supply, and cleaning the cockpit windows. Other servicepersons are responsible for the exterior of the aircraft. They wash, polish, touch up paint, and de-ice the outside of the airplane. They also work with chemicals that are used to prevent corrosion of surfaces.

*The baggage and air cargo handler* loads and unloads baggage, air mail, air express, and air cargo shipments. He or she operates baggage tugs, conveyors, fork lifts, and other baggage and air freight handling equipment.

*The aircraft fueler* operates the fueling equipment. This employee may fill a fuel truck and deliver the fuel to aircraft.

Other ramp personnel drive food trucks, mobile stairs, employees' buses, messenger cars, and conveyors. They also may transport cleaning equipment, aircraft air conditioning, and power carts.

**Ramp Planner.** The ramp planner keeps track of arriving aircraft and dispatches service units, cleaners, fuelers, baggage handlers, and food service trucks. He or she must know flight schedules.

**Cabin Maintenance Mechanic.** The cabin maintenance mechanic cleans and paints interiors of aircraft during periodic major overhauls; removes and installs carpets, seats, curtains, and bulkheads; and reupholsters seats. He or she also overhauls and cleans electrical equipment in cabins, such as lights, buffets, and coffeemakers.

**Food Service Employee.** The food service employees follow set recipes to prepare and cook food. They arrange silverware and dishes on serving trays and food items in serving dishes. They place food in either hot or refrigerated containers for pickup and delivery to the aircraft. They receive and clean soiled dishes.

**Auto Mechanic.** The auto mechanic services and repairs ground service equipment, such as portable stairs, fuel and food trucks, towing tractors, and employee buses.

**Administrative personnel.** In addition to the previously described jobs, airlines employ thousands of receptionists, typists, secretaries, stenographers, mail and file clerks, and computer personnel, as well as people in managerial positions such as training, public relations, publications, finance, personnel, and other kinds of work associated with business and industry. Salaries are generally above the average paid by industry and business.

**Professional Personnel.** Professional job opportunities within the airlines today break down into the following categories: architects, aeronautical research scientists, engineers, drafters, doctors, nurses, lawyers, and instructors. Intensive education and specialized training are required to perform many of these jobs. The personal qualifications are the same as those required of similar professionals in other fields. The salaries of airline professionals are among the highest paid to airline employees.

For more information on these career opportunities, request the Aviation Careers Series brochure entitled "Airline Non-Flying Careers."

## AIRCRAFT MANUFACTURING

Take a look at the aircraft manufacturing industry and you'll see a picture of ups and downs. At this writing, there are more orders for some of the new U.S.-built airliners than the manufacturers can fill. At the other end of the spectrum, the light aircraft—small piston-engine planes flown by pleasure and business pilots—are not selling as well as they have in the past, although a few manufacturers are keeping busy. In the middle of the scene, there is a steady but highly competitive market for corporate jets.

The major divisions within the aircraft manufacturing industry are airframe, components, accessory and equipment, and engine. The industry employs scientists, engineers, technicians, production workers, and administrative and support activities personnel.

**Scientists.** Scientists in the aircraft manufacturing industry can specialize in many fields: aerodynamics, physics, mathematics, chemistry, physiology, metallurgy, meteorology, cryogenics (the study of physics that pertains to the production and effects of very low temperatures) and avionics (or aviation electronics). The uses of composites and ceramics comprise a relatively new field of scientific inquiry.

**Engineers.** Engineering fields include design, aerodynamics, avionics, instrumentation, manufacturing materials, weights and balance, field service, and flight testing. More than half of the industry's scientists and engineers are in research and development work. The remainder are in production planning, quality control, tool designing, technical purchasing, technical sales and service, technical writing and illustrating, and related fields.

**Technicians.** Technicians include all persons engaged in work requiring knowledge of physical, life, engineering, and mathematical sciences. Technicians can specialize in any of the fields of study mentioned above for scientists and engineers. This job category also includes drafters and technical writers and illustrators.

**Aerospace Workers.** Aerospace workers engage in sheet metal and other metal work, composite fabrication, machinery and tool fabrication, assembly and installation, inspecting and testing (quality control), flight checkout, materials handling, and maintenance and protective custodial jobs.

For more information on these career opportunities, request the Aviation Careers Series brochure entitled "Aircraft Manufacturing."

## AVIATION MAINTENANCE AND AVIONICS

Aviation maintenance mechanics (including airframe and powerplant technicians, avionics technicians, and instrument repair personnel have the important responsibility of keeping airplanes and their equipment working safely and efficiently. They service, repair, and overhaul various aircraft components and systems including airframes, engines, electrical and hydraulic systems, propellers, avionics equipment, and aircraft instruments. In recent years their work has changed greatly because of advances in computer technology, solid state electronics, and composite structural material.

Aircraft mechanics employed by the airlines perform either line maintenance work (for example, routine maintenance, servicing, or emergency repairs at airline terminals) or major repairs and periodic inspections at an airline's overhaul base.

Aircraft mechanics in general aviation perform maintenance and repair jobs similar to those performed by airline mechanics, but they may work on small piston-engine or larger turbine-powered aircraft, depending on the type of business the facility specializes in.

An aircraft mechanic may be licensed or unlicensed. The licensed mechanic may receive from the Federal Aviation Administration (FAA) a Mechanic Certificate (with an airframe rating, powerplant rating, or rating for both) or a Repairman Certificate. FAA Mechanic Certificates are issued upon successful completion of oral, written, and practical examinations. A mechanic with an airframe, powerplant or airframe and powerplant (A&P) rating can work only on the specific parts of the aircraft for which he or she is rated. Similarly, a mechanic with an FAA Repairman Certificate can work only on those parts of the aircraft that the certificate specifically allows, such as radio or instruments, propellers, etc. The repair person who works on transmitting equipment aboard the aircraft does not need a license from the Federal Communications Commission; however, experts encourage these individuals to take the FCC exam because they may eventually become involved in satellites and satellite communication systems—the next logical step.

If you have an interest in electronics, you may choose to specialize in avionics: aircraft navigation and communication radios, weather radar systems, autopilots, and other electronic devices. This field is becoming more interesting and challenging as the technology expands. In the past, avionics were added to an airplane almost as an afterthought; today's digital aircraft depend upon sophisticated avionics systems as part of their design.

Industry observers say there is a demand for avionics specialists who are prepared to master the intricacies of the aircraft and work shoulder to shoulder with A&Ps. Because of a shortage of technicians and the complexity of aircraft systems, the industry needs more people who are cross-trained. They want A&Ps who can troubleshoot the black boxes, as a timesaver in the maintenance operations. Avionics technicians with the licensing that enables them to work on the airplane, either removing or reinstalling equipment, are especially in demand.

For more information on these career opportunities, request the Aviation Careers Series brochure entitled "Aviation Maintenance and Avionics."

## AIRPORT CAREERS

The airport is one of the most vital elements in our air transportation system. A well-equipped airport provides a variety of facilities for the aircraft and their crews and passengers. These include runways and taxiways, which may be lighted for day-and-night use; a terminal building with lounge areas for passengers, and possibly a restaurant and shops; automobile parking lots; ramp areas and hangars for aircraft storage; and maintenance shops for aircraft and avionics.

There are about 17,490 airports in the United States and approximately 4,000 heliports (landing sites for helicopters). More than 5,000 of these landing facilities are used by the public. It may surprise you to learn that only about 680 airports are served by airlines. Most of the other airports are used by general aviation pilots and their aircraft.

Some airports are owned by municipalities—states, counties, and cities. Others are privately-owned businesses.

Here are descriptions of positions you can expect to find at an airport.

**Director or Manager**. Airports are usually operated by a director or manager responsible either to the private owners of the airport or to the local government authorities. The airport manager must be competent in public relations, economics, business management, civil engineering, personnel management, labor relations, and politics. The manager may be required to:

1. *Make and enforce airport rules and regulations.*
2. *Plan and supervise maintenance and safety programs.*
3. *Negotiate leases with airport tenants, such as airlines.*
4. *Survey future needs of the airport and make recommendations.*
5. *Set up the airport budget.*
6. *Promote the use of the airport.*
7. *Train and supervise employees.*

Depending upon the size of the airport, the manager may supervise an assistant manager, engineer, controller, personnel officer, maintenance superintendent, and supporting office workers.

If the manager is self-employed as a small airport operator, he or she probably also runs an aircraft repair station, sells aviation fuel, gives flight lessons, and offers air taxi or charter flights.

**Assistant Manager.** The assistant helps the manager carry out administrative responsibilities and may be in charge of maintenance employees, airport equipment, airport tenant relations, or any of the other kinds of work associated with an airport.

**Engineer.** The engineer plans improvements and expansion of the airport, checks on plans submitted by architects and contractors, oversees construction, and handles real estate and zoning problems. The engineer also may direct the maintenance of runways, taxiways, hangars, terminal buildings, and grounds.

**Safety Personnel.** Most airports with airline service employ a few firefighters and rescue workers, some of whom may be trained as emergency medical technicians or paramedics. Airport firefighters are usually skilled in both aircraft firefighting and building or structural firefighting.

**Serviceperson.** Under the direction of the airport manager or engineer, a serviceperson may perform one or more of the following jobs:

1. *Cut grass on airport grounds and maintain shrubbery.*
2. *Operate snow removal equipment.*
3. *Service runway lights and replace defective lamps and fuses.*
4. *Maintain the airport's electrical services, paint, and do the general carpentry work required for small repair jobs.*

**Terminal Concessionaire.** Airports that are served by airlines provide such services as restaurants, newsstands, gift and book shops, car rental agencies, and skycap baggage service. (Only a few airlines employ skycaps; most leave this service to terminal concessions.) Workers in the airport flight kitchens cater to airlines that do not have their own flight kitchens. While not on the airport manager's staff, workers in the concessions are mentioned here because they have a place in the total employment picture of the airport.

**Fixed Base Operator (FBO).** A fixed base operator is a retail firm that sells general aviation products or services at an airport. The FBO may employ one or two people or may have a hundred workers. One or more of the following services are offered: fueling; aircraft, avionics and/or instrument sales and service; flight training; air taxi service and charter flights; and aircraft exterior and/or interior modification.

Depending on the size and scope of the airport's operations, the FBO employs aviation mechanics, flight instructors, and aircraft sales persons. It also may employ a licensed aviation mechanic to train and supervise mechanics. FBO personnel will often arrange for ground transportation and overnight accommodations for general aviation pilots and their passengers.

**Lineperson.** The fixed base operator employs linepersons or ramp servicepersons who meet arriving aircraft, guide them to parking spots, assist pilots in securing their aircraft, and otherwise serve the general aviation and airline customers. Linepersons also fuel and service aircraft and report to the aircraft owners any signs of incipient trouble with their planes, such as fluid leaks.

Linepersons are frequently young people who are interested in aviation and begin their aviation careers by building up experience with aircraft under the guidance of a fixed base operator. They are usually paid an hourly rate and often work part-time after school hours, on weekends, and summers. With their earnings, they can fly or take up an aviation mechanic's trade. The lineperson's job is an important basic career development step and can lead to many aviation careers.

Other personnel who work either for the FBO or airport manager include accountant/bookkeepers, secretaries, and typists. Salaries, qualifications, and training opportunities are the same as for other workers in these areas of employment.

For more information on these career opportunities, request the Aviation Careers Series brochure entitled "Airport Careers."

## GOVERNMENT CAREERS

An interesting alternative to working in the private sector is a career in government. Many highly responsible aviation positions are to be found in the FAA and other Federal agencies. In addition, state and local government agencies are involved in aviation.

Among its many functions in aviation, the FAA is responsible for controlling the movement of aircraft throughout the nation, establishing and maintaining electronic navigation aids, licensing pilots and aircraft mechanics, and certifying the airworthiness of aircraft.

## THE FEDERAL AVIATION ADMINISTRATION

**Air Traffic Control Specialist.** The air traffic control specialists at FAA airport traffic control towers (terminals) direct air traffic so it flows smoothly and efficiently. The controllers give pilots taxiing and takeoff instructions, air traffic clearances, and advice based on numerous sources— their own observations and information they receive from the National Weather Service, Air Route Traffic Control Centers (ARTCC), Flight Service Stations (FSS), and aircraft pilots.

Terminal area controllers separate landing and departing aircraft. They transfer control of aircraft on instrument flights to the ARTCC controller when the aircraft leaves their airspace, and they receive control of aircraft on instrument flights coming into their airspace from controllers at adjacent facilities. They must be able to quickly recall registration numbers of aircraft under their control, the aircraft types and speeds, positions in the air, and also the location of navigational aids or landmarks in the area.

The ARTCC controllers give aircraft instructions, air traffic clearances, and advice regarding flight conditions during the enroute portion of flights. They provide separation between aircraft flying along the Federal airways or operating into or out of airports not served by a terminal facility.

Center controllers use radar or manual procedures to keep track of the progress of all instrument flights within the center's airspace. The controllers transfer control of aircraft to the controllers in the adjacent center or to the approach control or terminal when the aircraft enters that facility's airspace. Center controllers are required to use computer equipment, radio, radar, telephones, and other electronic communication devices. Due to the radar equipment, they work in semi-darkness, and unlike the controllers in airport traffic control towers, they never see the aircraft they control except as "targets" on the radar scope.

Air traffic control specialists also work in flight service stations. They provide preflight, in-flight, and emergency assistance to all pilots on request. They communicate information about actual and forecast weather conditions for a specific flight, relay air traffic control instructions, assist pilots in emergencies, provide airport advisory service, and initiate and participate in searches for missing or overdue aircraft.

**Electronics Technician.** Electronics technicians install and maintain electronics equipment required for navigation, communications between aircraft and ground services, and control of aircraft movements. They work with radar, radio, computers, wire communications systems, and other electronic devices at airports and along the network of Federal airways. Preventive and corrective maintenance is part of their jobs. Electronics technicians may also specialize in design, development, and evaluation of new types of electronics equipment for the Federal airways.

**Aviation Safety Inspector.** Aviation safety inspectors develop, administer, and enforce regulations and standards concerning civil aviation safety. They monitor the airworthiness of aircraft and aircraft systems; the competence of pilots, mechanics, and other aviation personnel; and the safety aspects of aviation facilities, equipment, and procedures. Aviation safety inspectors must be knowledgeable about the operation, maintenance, and manufacture of aircraft and aircraft systems.

**Airspace System Inspection Pilot.** These pilots conduct inflight inspection of ground-based air navigational facilities to determine if they are operating correctly. They fly multi-engine, high-performance jet aircraft with specially installed, ultra-sophisticated, computerized, and automated electronic equipment. They record and analyze facility performance and report potential hazards to air navigation for correction. They assist in accident investigations by making special flight tests of any FAA navigational aids involved.

**Flight Test Pilot.** FAA flight test pilots check the airworthiness of aircraft through inspection, flight testing, and evaluations of flight performance, engine operation, and flight characteristics of either prototype aircraft or modifications of production aircraft and aircraft components that are presented for FAA type certification. They supervise flight-test designees and participate in investigations of accidents and violations of the Federal Aviation Regulations.

**Engineer.** The FAA employs engineers of all specialties to work on research and development problems in aviation, such as V/STOL (vertical short takeoff and landing) aircraft, aircraft sound, sonic boom effects, hypersonic aircraft, and new equipment and devices to increase aviation safety. Engineers also provide guidance in airport design, construction, operation, and maintenance.

**Other Professional Employees.** The FAA employs other professionals as well: airport safety specialists, urban planners, economists, mathematicians, statisticians, program officers, management analysts, and budget analysts. Physicians who specialize in aviation medicine are hired by the FAA in limited numbers. These physicians study the effects of flying on the human body, the effects of fatigue on pilot performance, the need for oxygen above certain altitudes, vision and hearing standards, the tension and stress factors associated with the air traffic controller's job, and the standards of the various classes of medical examinations required for pilots and other members of flight crews.

**Maintenance Mechanic.** FAA maintenance mechanics maintain aids to navigation, such as the approach light systems serving airport runways. They also work on the structural, electrical, and mechanical devices that are major parts of other facilities. The job involves carpentry, painting, plumbing, electrical repairs, and masonry construction. Maintenance mechanics also install, repair, and maintain air conditioning, heating, and power-generating equipment.

## U.S. MILITARY SERVICES

**Military.** There are many aviation career opportunities for both men and women in the military services as enlisted personnel and officers. The Air Force offers the greatest number of aviation-related training and employment opportunities to fly as a pilot or to work as an aircraft mechanic, air traffic controller, electronic technician, flight nurse, or meteorological technician, to name a few.

**The Navy and Marine Corps** also have aviation jobs that are counterparts to those in the Air Force. Army aviation is mostly connected with the operation and maintenance of helicopters and subsonic light planes. The Army hires flight crews, ground service people, and weather specialists to support its operations. The U.S. Coast Guard operates aircraft for search and purposes. Many military aviation jobs are good preparation for similar jobs in civilian life. For example, a high percentage of airline pilots receive their principal training and experience in the military.

**Civilian.** The U.S. military services employ many civilians for jobs in aviation, such as aircraft mechanics, engineers, technicians, and general office workers (secretaries and typists, for example). These civilian jobs come under the Federal Civil Service, and employees perform many of the same tasks and receive the same wages and benefits as their counterparts in the FAA or other Federal departments and agencies.

## OTHER FEDERAL GOVERNMENT DEPARTMENTS AND AGENCIES

Many other Federal agencies play important roles in aviation. The National Aeronautics and Space Administration, for example, is responsible for research into the problems of flight within and outside the Earth's atmosphere.

National Transportation Safety Board accident investigators interview survivors and witnesses and examine aircraft parts, instruments, and engines. They also review maintenance and flight records to determine the probable cause of airplane accidents. Travel and field work are involved.

National Weather Service meteorologists play a key role in providing aviation weather information. Flight and weather are so interrelated that many people in aviation look upon the meteorologist as a member of the aviation team. Thus, the meteorologist deserves mention in any discussion of vocations in aviation, even though these functions are not entirely for the benefit of the aviation community.

Numerous Federal departments, bureaus, and agencies operate aircraft to carry on their work more effectively. For example, the Fish and Wildlife Service of the Department of the Interior uses airplanes to conduct wildlife censuses; the Department of Agriculture's Forest Service uses aircraft to check on aerial forest-spraying contracted to commercial operators or to oversee forest firefighting procedures; the Immigration and Naturalization Service of the Department of Justice utilizes aircraft to detect people entering the United States illegally.

## STATE AVIATION JOBS

Almost every state has an Aeronautics Department or Commission, which consists of a small number of aviation-minded men and women, usually appointed by the Governor to make policies about aviation activities within the state. Persons appointed may not be considered employees and may be paid only expenses connected with their attendance at meetings. If the state's department or commission is well-funded, it may employ people to work in the areas of airport design and operation, flight safety, and promotion of aviation activities in the state. Positions include administrative personnel, pilots, field service representatives, safety officers, engineers, and aircraft mechanics, among others.

For more information on these career opportunities, request the Careers in Aviation brochure entitled "Government."

## WOMEN IN AVIATION

Even in aviation's early days, women pilots equalled male pilots in displays of ambition, skill and fortitude. Amelia Earhart and Jacqueline Cochran come readily to mind. In commercial aviation, however, women were for many years restricted to "women's jobs" as flight attendant, reservations agent, etc.

Times have changed! Today, a woman can be an airline captain, an astronaut, or anything she wants to be. Some of these women have told their inspiring stories in the Careers in Aviation brochure "Women in Aviation." It's yours for the asking.

## Aviation Education Officers

***FAA Headquarters***

Phillip S. Woodruff, APA-100
Director of Aviation Education

Aviation Education Officers
Ms. Valerie Collins
Ms. Mary Jo Byberg
Ms. Josie M. Clark
Ms. Latisha A. Ferguson
800 Independence Avenue, SW
Office of Public Affairs
Aviation Education Program
Washington, DC 20591
(202) 267-3471

***Aeronautical Center***

Mr. Robert Hoppers, AAC-5
Room 356, Headquarters Building
P.O. Box 25082
Oklahoma City, OK 73125
(405) 680-7500

***Technical Center***

Ms. Michele Pareene, ACM-100
Human Resource Management Division
Atlantic City International Airport
Atlantic City, NJ 08405
(609) 484-6032

***Alaskan Region***

Ms. Mary Lou Wojtalik, AAL-5B
222 West 7th Avenue, Box 14
Anchorage, AK 99513-7587
(907) 271-5293
STATE: Alaska

***Central Region***

Ms. Patrice Shalda, ACE-5
601 East 12th Street
Federal Building, Room 1501
Kansas City, MO 64106
(816) 426-5449
STATES: Iowa, Kansas, Missouri, and Nebraska

***Eastern Region***

Mr. Charles Pagnini, AEA-15C
JFK International Airport
Federal Building
Jamaica, NY 11430
(718) 553-1056
STATES: Delaware, District of Columbia, Maryland, New Jersey, New York, Pennsylvania, Virginia, and West Virginia

***Great Lakes Region***

Mr. Lee Carlson, AGL-5A
O'Hare Lake Office Center
2300 East Devon Avenue
Des Plaines, IL 60018
(312) 694-7042
STATES: Illinois, Indiana, Michigan, Minnesota, North Dakota, Ohio, South Dakota, and Wisconsin

***New England Region***

Ms. Shelia Bauer, ANE-8
12 New England Executive Park
Burlington, MA 01803
(617) 273-7064
STATES: Connecticut, Maine, New Hampshire, Rhode Island, Vermont, and Massachusetts

***Northwest Mountain Region***

Ms. Shelly McGillivary, ANM-5E
1601 Lind Avenue, SW
Renton, WA 98055
(206) 227-2804
STATES: Colorado, Idaho, Montana, Oregon, Utah, Washington, and Wyoming

***Southern Region***

Ms. Kathleen Bergen, ASO-5
PO Box 20636
Atlanta, GA 30320
(404) 763-7201
STATES: Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico, and the Virgin Islands

***Southwest Region***

Ms. Debra Myers, ASW-5
4400 Blue Mound Road
Ft. Worth, TX 76193-0005
(817) 624-5804
STATES: Arkansas, Louisiana, New Mexico, Oklahoma, and Texas

***Western-Pacific Region***

Mr. Hank Verbais, AWP-5
PO Box 92007
Worldway Postal Center
Los Angeles, CA 90009
(213) 297-1431
STATES: Arizona, California, Nevada, and Hawaii

# Aviation Education Resource Centers

### *Alabama*

Alabama Aviation
Technical College
Ms. Megan Johnson, Director
Learning Resource Center
PO Box 1209
Ozark, AL 36361
(205) 774-5113

University of North Alabama
Ms. Michele R. Walker
Programming Coordinator
UNA Box 5145
Florence, AL 35632-0001
(205) 760-4623

University Aviation Association
Mr. Gary W. Kiteley
Executive Director
3410 Skyway Drive
Opelika, AL 36801
(205) 844-2434

### *Alaska*

University of Alaska Fairbanks
Mr. Dennis Stephens
Collection Development Officer
Elmer E. Rasmuson Library
Fairbanks, AK 99775-1006
(907) 474-6695

### *Arizona*

Embry-Riddle Aeronautical University
Ms. Karen Hudson
Educational Programs Coordinator
3200 N. Willow Creek Road
Prescott, AZ 86301
(602) 771–6673

### *California*

National University
Mr. Ernest Wendt
Chair, Department of Applied Sciences
4141 Camino Del Rio South
San Diego, CA 92108
(619) 563-7122

San Jose State University
Dr. H. Gene Little
Chairman, Department of Aviation
1 Washington Square
San Jose, CA 95192-0081
(408) 924-6580

Museum of Flying
Mr. Harvey Ferer
2772 Donald Douglas Loop North
Santa Monica, CA 90405
(310) 392-8822

### *Colorado*

U.S. Space Foundation
Dr. Jerry Brown
Educational Director
1525 Vapor Trail
Colorado Springs, CO 80916
(719) 550-1000

Metropolitan State College of Denver
Mr. Jonathan R. Burke
Assistant Professor
Aerospace Science Department
Campus Box 30, P.O. Box 173362
Denver, CO 80217–3362
(303) 556–2923

### *Connecticut*

Connecticut Department of
Transportation
Bureau of Aeronautics
Ms. Tambri Graville
24 Wolcott Hill Road
PO Drawer A
Wethersfield, CT 06109
(203) 566-4417

### *Delaware*

Delaware Teachers Center
Ms. Stephanie Wright
3401 Green Street
Claymont, DE 19703
(302) 792–3806

### *Florida*

Embry-Riddle Aeronautical University
Ms. Patricia Fleener-Ryan
AvEd Teacher Resource Center
Daytona Beach, FL 32114
(904) 226-6499

Florida Institute of Technology
Dr. Ballard M. Barker
Head, Department of Aviation Studies
The School of Aeronautics
150 West University Boulevard
Melbourne, FL 32901-6988
(407) 768-8000, Ext. 8120

Florida Memorial College
Mr. Anthony J. Sharp, Director
Division of Airway Science
15800 Northwest 42 Avenue
Miami, FL 33054
(305) 623-1440

### *Georgia*

Conyers Middle School
Ms. Viki Dennard
Assistant Principal
335 Sigman Road
Conyers, Georgia 30207–3699
(404) 483-3371

### *Hawaii*

Mid-Pacific Institute
Dr. Phillip R. Brieske
Aviation/Space Science
2445 Kaala Street
Honolulu, HI 96822
(808) 973-5000

### *Idaho*

Idaho State Bureau of Aeronautics
Mr. John Maakestad
Safety/Information Officer
Chief Pilot
3483 Rickenbacker Street
Boise, Idaho 83705-5018
(208) 334-8775

### *Illinois*

Parks College of
St. Louis University
Dr. Peggy Baty
Assistant Vice President and Dean
500 Falling Springs Road
Cahokia, IL 62206
(618) 337-7500

Southern Illinois University
Dr. Elaine Vitello
College of Technical Careers
Room 222
Carbondale, IL 62901
(618) 453-8821

State of Illinois
Division of Aeronautics
Mr. Richard M. Ware
One Langhorne Bond Drive
Capital Airport
Springfield, IL 62707-8415
(217) 785-8516

***Kansas***

Kansas State University-Salina
Ms. Karlene Propst
Tullis Library
2408 Scanlan Avenue
Salina, KS 67401
(913) 825-0275

***Louisiana***

Louisiana State University
Dr. Marlon Abbas
Director of the Trans. Systems Group
Louisiana Trans. Resource Center
4101 Gourrier Avenue
Baton Rouge, LA 70808
(504) 767-9127

***Maine***

Kennebec Valley Technical College
Ms. Sue Doner
92 Western Avenue
Fairfield, ME 04937-0020
(207) 453-9762

Biddeford School Department
Ms. Sara Jane Poli
Maplewood Ave.
Biddeford, ME 04005
(207) 283-8280

Penobscot Nation Tribal Administration
Mr. Mark Sanborn
Assistant Director
Vocational Training and Education
6 River Road, Community Building
Indian Island, ME 04468
(207) 827–7776

***Massachusetts***

Bridgewater State College
Mr. Bill Annesley
Management. Science & Aviation
Science Dept.
Bridgewater, MA 02325
(508) 697-1395

North Shore Community College
Dr. Robert Finklestein
Beverly, MA 01915
(508) 922-6722

Museum of Science
Ms. Carolyn Kirdahy
Lyman Library
Science Park
Boston, MA 02114-1099
(617) 589-0266

Westfield State College
Ms. Maureen McCartney
Director of Career Services
Ely Campus Center
Western Avenue
Westfield, MA 01086
(413) 568-3311 ext. 206

Massachusetts Aeronautics Comm.
Transportation Library
Dr. Toby Penstlen
10 Park Plaza
Boston, MA 02116–3966
(617) 973–8000

***Michigan***

Oakland University
Ms. Karen Conrad, Interim Director
Aviation & Space Center
216 O'Dowd Hall
Room 216
Rochester, MI 48309-4401
(313) 370-2485

Project STARS
Ms. Barbara Koscak
Boc 450082, Building 814
Selfridge ANG Base, MI 48045-0082
(313) 466-4884

***Minnesota***

Minnesota Dept. of Transportation
Office of Aeronautics
Mr. Gordon Hoff
Director of Aviation Educ. Relations
644 Bayfield Street
St. Paul, MN 55107-1008
(612) 297-7652

Vermilion Communication College
Mr. Julius Salinas
1900 E. Camp Street
Ely, MN 55731
(218) 365-7200

***Nebraska***

University of Nebraska-Omaha
Mr. William S. Shea
Director, Aviation Institute
60th and Dodge
Omaha, NE 68182-0508
(402) 554-3424

Nebraska Department of Aeronautics
Mr. Val J. Hruska
Aviation Specialist
PO Box 82088
Lincoln, NE 68501-2088
(402) 471-2371

***New Hampshire***

New Hampshire Dept. of Transportation
Division of Aeronautics
Mr. Ronald Wanner
65 Airport Road
Concord Municipal Airport
Concord, NH 03301-5298
(603) 271-2551

***New Mexico***

University of New Mexico
Mr. Richard S. Sanchez
University College Room 11
Albuquerque, NM 87131–1456
(505) 277–3861

***New York***

Dowling College
Dr. Albert E. Donor
Provost, Executive Vice President
Oakdale, Long Island, NY 11769-1999
(516) 244-3200

***North Dakota***

University of North Dakota
Mr. Charles L. Robertson
Assistant Professor
Department of Aviation
Box 8216, University Station
Grand Forks, ND 58202-8216
(707) 777-2791

***Oklahoma***

University of Oklahoma
Dr. Lee Morris, Director
Education and Aviation/Aerospace
1700 Asp Avenue
Norman, OK 73037-0001
(405) 325-1964

***Rhode Island***

Warwick Public Schools
Mr. Anthony Gagliardi
Warwick Career and Tech School
574 Centerville Road
Warwick, RI 02889
(401) 737-3300

***Tennessee***

Middle Tennessee State University
Dr. Wallace R. Maples
Chairman, Aerospace Department
East Main Street
PO Box 67 MTSU
Murfreesboro, TN 37132
(615) 898-2788

***Texas***

Texas Southern University
Dr. I. Richmond Nettey
Director of Airway Science Program
3100 Cleburne Avenue
Houston, TX 77004
(713) 639-1847

Texas State Technical Institute
Campus Library
Aerospace Technologies
3801 Campus Drive
Waco, Texas 76705
(817) 867-4838

***Vermont***

St. Johnsbury Academy
Mr. John Barney
Vocational Director
St. Johnsbury, VT 05816
(802) 748-8171

***Virginia***

Virginia Aviation Museum
Ms. Betty P. Wilson
5701 Huntsman Road
Sandston, VA 23150-1946
(804) 786-1364

***Washington***

Museum of Flight
Mr. Gregory Moyce
Education Program Manager
9404 East Marginal Way South
Seattle, WA 98108
(206) 764-5700

***West Virginia***

Salem-Teikyo University
Dr. Ronald Ohl, President
223 West Main Street
Salem, WV 26426
(304) 782-5234

***Wisconsin***

Experimental Aircraft Association
Mr. Chuck Larsen
EAA Aviation Center
3000 Poberezny Road
Oshkosh, WI 54903-3065
(414) 426-4800

Department of Transportation
Bureau of Aeronautics
Mr. Duane Esse
4802 Sheboygan Avenue
PO Box 7914
Madison, WI 53707-7914
(608) 266-3351

University of Wisconsin-Superior
Mr. Michael J. Wallschlaeger
Chairman, Division of Education
1800 Grand Avenue
Superior, WI 54880-2898
(715) 394-8309

U.S. G.P.O.:1992-316-614

# AOPA'S 1994 AVIATION FACT CARD

Aircraft Owners and Pilots Association
421 Aviation Way, Frederick, Maryland 21701
301/695-2000 or 800/USA-AOPA

Primary sources of data include the Federal Aviation Administration, the National Transportation Safety Board, the General Aviation Manufacturers Association, and others. 1992 is the latest year complete information is available

## 1992 DATA

### ACTIVE CERTIFICATED PILOTS

| | Total | % | Women* | % |
|---|---|---|---|---|
| Pilot Certificates Held | 682,959 | 100.0 | 40,620 | 100.0 |
| Student | 114,597 | 16.8 | 13,921 | 34.3 |
| Recreational | 187 | 0.0 | 10 | 0.0 |
| Private | 288,078 | 42.2 | 17,276 | 42.5 |
| Commercial | 146,385 | 21.4 | 5,918 | 14.6 |
| ATP | 115,855 | 17.0 | 2,530 | 6.2 |
| Helicopter (only) | 9,652 | 1.4 | 313 | 0.8 |
| Glider (only)** | 8,205 | 1.2 | 652 | 1.6 |
| Flight Instructor | 72,148 | 10.6 | 3,964 | 9.8 |
| Instrument Rated | 306,169 | 44.8 | NA | — |
| Helicopter (total) | 32,158 | 4.7 | NA | — |
| Glider (total) | 19,639 | 2.9 | NA | — |
| Non-Pilot Certificates Held | 540,548 | 100.0 | 11,514 | 100.0 |
| Mechanic | 384,669 | 71.2 | 4,398 | 38.2 |
| Parachute Rigger | 8,163 | 1.5 | 390 | 3.4 |
| Ground Instructor | 73,276 | 13.6 | 4,338 | 37.7 |
| Dispatcher | 12,264 | 2.3 | 1,004 | 8.7 |
| Flight Navigator | 1,154 | 0.2 | 0 | 0.0 |
| Flight Engineer | 61,022 | 11.3 | 1,384 | 12.0 |

* 5.9% of all pilots are women

** Medical examinations not required, totals represent only pilots who have a current medical and have no other pilot certificate

NA—Not Available

### ACTIVE CIVIL AIRCRAFT

| | Total | % | % |
|---|---|---|---|
| Total Aircraft | 191,753 | 100.0 | 100.0 |
| Piston | 162,965 | 85.0 | — |
| Turboprop | 6,598 | 3.4 | — |
| Turbojet | 8,468 | 4.4 | — |
| Rotorcraft | 5,886 | 3.1 | — |
| Other | 7,836 | 4.1 | — |
| General Aviation Aircraft | 184,433 | 100.0 | 96.2 |
| Piston, Single-engine | 143,580 | 77.8 | — |
| Piston, Multiengine | 18,451 | 10.0 | — |
| Piston, Other | 87 | 0.0 | — |
| Turboprop | 4,704 | 2.6 | — |
| Turbojet | 4,022 | 2.2 | — |
| Rotorcraft | 5,753 | 3.1 | — |
| Other | 7,836 | 4.2 | — |
| Air Carrier Aircraft | 7,320 | 100.0 | 3.8 |
| Piston | 847 | 11.6 | — |
| Turboprop | 1,894 | 25.9 | — |
| Turbojet | 4,446 | 60.7 | — |
| Rotorcraft | 133 | 1.8 | — |

### U.S. AIRCRAFT SHIPMENTS

| | Total | % | % |
|---|---|---|---|
| Total Aircraft Shipments | 1,790 | 100.0 | — |
| General Aviation | 899 | 50.2 | 100.0 |
| Single-engine | 510 | — | 56.7 |
| Multiengine | 41 | — | 4.6 |
| Turboprop | 177 | — | 19.7 |
| Turbojet | 171 | — | 19.0 |
| Helicopter | 567 | 31.7 | — |
| Air Transport | 324 | 18.1 | — |

### ESTIMATED AVERAGE PER-UNIT COST OF NEW AIRCRAFT

| Aircraft Type | $ |
|---|---|
| Piston Aircraft (single-/multiengine) | 166,969 |
| Turboprop | 2,598,870 |
| Turbojet | 7,508,772 |

### GENERAL AVIATION AVIONICS EQUIPMENT ESTIMATES*

| | Total | % |
|---|---|---|
| Total Active General Aviation Aircraft | 184,433 | 100.0 |
| With Electrical System | 176,502 | 95.7 |
| Without Electrical System | 7,931 | 4.3 |
| VHF Communications | | |
| 360 Channel Fixed | 61,047 | 33.1 |
| 720 Channel Fixed | 128,919 | 69.9 |
| No VHF Communication | 15,677 | 8.5 |
| Transponder Equipment | | |
| Mode A Transponder | 12,173 | 6.6 |
| Mode C Transponder | 151,604 | 82.2 |
| Mode S Transponder | 1,107 | 0.6 |
| No Transponder | 38,362 | 20.8 |
| Precision Approach Equipment | | |
| Localizer | 119,144 | 64.6 |
| Marker Beacon | 112,320 | 60.9 |
| Glideslope | 109,000 | 59.1 |
| No Precision Approach Equipment | 71,560 | 38.8 |
| Navigation Equipment | | |
| 100 Channel Fixed VOR | 48,506 | 26.3 |
| 200 Channel Fixed VOR | 114,717 | 62.2 |
| ADF | 110,291 | 59.8 |
| DME | 77,093 | 41.8 |
| RNAV | 28,403 | 15.4 |
| Loran | 95,905 | 52.0 |
| Loran (VFR only) | 78,753 | 42.7 |
| Loran (IFR Navigation) | 12,726 | 6.9 |
| Loran (IFR Approach) | 4,980 | 2.7 |
| Omega | 3,135 | 1.7 |
| Radar Altimeter | 17,152 | 9.3 |
| Weather Radar | 20,288 | 11.0 |
| Thunderstorm Detector | 16,968 | 9.2 |
| GPS System | 2,766 | 1.5 |
| No Navigation Equipment | 26,005 | 14.1 |
| Guidance/Control Equipment | | |
| Flight Director | 20,472 | 11.1 |
| Autopilot—Longitude | 64,552 | 35.0 |
| Autopilot—Vertical | 42,788 | 23.2 |
| Autopilot—Lateral | 53,854 | 29.2 |
| Autopilot—Approach Mode | 39,653 | 21.5 |
| No Guidance/Control Equipment | 124,861 | 67.7 |

* 1992 totals based on avionics percentage estimates obtained with the FAA's 1991 General Aviation Activity and Avionics Survey

### ACTIVITY ESTIMATES

| | Total | % |
|---|---|---|
| Hours Flown (Millions) | 43.1 | 100.0 |
| General Aviation | 26.5 | 61.5 |
| Air Carrier* | 16.6 | 38.5 |
| Miles Flown (Millions) | 8,527.1 | 100.0 |
| General Aviation | 3,132.1 | 36.7 |
| Air Carrier** | 5,395.0 | 63.3 |
| Departures (Millions) | 50.5 | 100.0 |
| General Aviation | 39.6 | 78.4 |
| Air Carrier** | 10.9 | 21.6 |
| Passengers (Millions) | 572.3 | 100.0 |
| General Aviation*** | 99.0 | 17.3 |
| Air Carrier**** | 473.3 | 82.7 |
| Fuel Consumed (Million Gallons) ● | 16,593.0 | 100.0 |
| General Aviation | 822.0 | 5.0 |
| Air Carrier | 15,771.0 | 95.0 |
| Avgas | 305.0 | 1.8 |
| Jet Fuel | 16,288.0 | 98.2 |

* Includes U.S. scheduled and unscheduled Part 121 and Part 135 operators

** Includes U.S. scheduled and unscheduled Part 121 operators and scheduled Part 135 operators

*** Based on 2.5 passengers per general aviation departure

**** Includes U.S. scheduled Part 121 operators only

● Estimated

# 1992 DATA

### U.S. AIRPORTS

| | Total | % | % |
|---|---|---|---|
| Aircraft Landing Facilities | 17,846 | 100.0 | 100.0 |
| Airports | 13,016 | 72.9 | — |
| Heliports | 4,323 | 24.2 | — |
| STOLports | 74 | 0.4 | — |
| Seaplane Bases | 433 | 2.4 | — |
| Publicly Owned | 5,116 | — | 28.7 |
| Privately Owned | 12,730 | — | 71.3 |
| Public Use | 5,545 | — | 31.1 |
| Limited Use | 12,301 | — | 68.9 |
| Airline-served | 664 | 100.0 | 3.7 |
| Scheduled | 388 | 58.4 | 2.2 |
| Unscheduled/Limited | 276 | 41.6 | 1.5 |
| Longest Runway | | | |
| Less than 3,000 ft | 12,027 | — | 67.4 |
| Between 3,000 ft and 5,999 ft | 4,844 | — | 27.1 |
| Between 6,000 ft and 9,999 ft | 732 | — | 4.1 |
| 10,000 ft or more | 243 | — | 1.4 |
| 1992 Landing Facilities Abandoned | 225 | 100.0 | — |
| Public Use | 18 | 8.0 | — |
| Limited Use | 207 | 92.0 | — |

### TEN BUSIEST U.S. AIRPORTS (FY)

| Airport | Total Operations | General Aviation Operations | % |
|---|---|---|---|
| Chicago O'Hare | 838,093 | 41,126 | 4.9 |
| Dallas/Ft. Worth | 763,372 | 15,793 | 2.1 |
| Los Angeles Int'l | 678,398 | 63,675 | 9.4 |
| Atlanta Int'l | 611,889 | 19,667 | 3.2 |
| Santa Ana | 557,442 | 466,982 | 83.8 |
| Van Nuys | 530,337 | 529,199 | 99.8 |
| Denver Stapleton | 499,001 | 31,580 | 6.3 |
| Phoenix Sky Harbor | 487,615 | 104,931 | 21.5 |
| Miami Int'l | 486,222 | 75,569 | 15.5 |
| Boston Logan | 482,582 | 31,954 | 6.6 |

### AERONAUTICAL FACILITIES

| | |
|---|---|
| Air Route Traffic Control Centers | 24 |
| Air Traffic Control Towers | 687 |
| IFR Towers | 250 |
| VFR Towers | 433 |
| CERAPS/TRACON Towers | 4 |
| Radar Approach Control Facilities | 241 |
| Instrument Landing Facilities | 1,215 |
| Full ILS | 948 |
| Partial ILS | 211 |
| Localizer Directional Aid (LDA) | 23 |
| Microwave Landing System (MLS) | 5 |
| Simplified Directional Facility (SDF) | 28 |
| VOR/VORTAC Facilities | 1,039 |
| Nondirectional Beacons (NDBs) | 1,336 |
| Direction Finders (DFs) | 90 |
| Flight Service Stations (FSSs) | 179 |
| International Flight Service Stations (IFSSs) | 3 |

### TRANSPORTATION FATALITIES

(Preliminary Data as of December 31, 1992)

| | Fatalities | % |
|---|---|---|
| Total Transportation Fatalities | 41,917 | 100.0 |
| Highway | 39,200 | 93.5 |
| Aviation | 1,013 | 2.4 |
| Marine | 993 | 2.4 |
| Railroads | 691 | 1.6 |
| Other | 20 | 0.0 |

### U.S. CIVIL AVIATION ACCIDENT DATA

(Preliminary Data as of January 15, 1993)

| | Total | % |
|---|---|---|
| Total Accidents | 2,072 | 100.0 |
| General Aviation | 1,956 | 94.4 |
| Air Carrier* | 116 | 5.6 |
| Total Fatal Accidents | 443 | 100.0 |
| General Aviation | 408 | 92.1 |
| Air Carrier* | 35 | 7.9 |
| Total Fatalities | 932 | 100.0 |
| General Aviation | 812 | 87.1 |
| Air Carrier* | 120 | 12.9 |

| | Total Accidents | Fatal Accidents |
|---|---|---|
| Rate per 100,000 Hours Flown** | 4.73 | 1.01 |
| General Aviation | 7.19 | 1.50 |
| Air Carrier* | 0.70 | 0.21 |
| Rate per 100,000 Departures*** | 4.10 | 0.88 |
| General Aviation | 4.94 | 1.03 |
| Air Carrier* | 1.06 | 0.32 |

* Includes air carrier (scheduled and unscheduled) commuter and air taxi accident data

** Based on NTSB estimated data (27.19 million hours flown by general aviation operators and 16.64 million hours flown by the air carriers)

*** Based on FAA (39.6 million general aviation departures) and NTSB estimated data (10.9 million air carrier and scheduled commuter departures)

## PRELIMINARY/ ESTIMATED 1993 DATA

| | Total | % |
|---|---|---|
| Pilot Certificates Held | 686,800 | 100.0 |
| Student | 115,000 | 16.7 |
| Private | 286,900 | 41.9 |
| Commercial | 148,600 | 21.6 |
| ATP | 118,200 | 17.2 |
| Instrument Rated | 309,800 | 45.0 |
| Active General Aviation Aircraft | 180,900 | 100.0 |
| Piston, Single-engine | 140,000 | 77.4 |
| Piston, Multiengine | 18,200 | 10.1 |
| Turboprop | 4,900 | 2.7 |
| Turbojet | 4,100 | 2.3 |
| General Aviation Hours Flown (Millions) | 26.0 | — |

## THE PAST—1982 and 1987 vs. 1992

| | 1982 | 1987 | 1992 | % Change from 1982 |
|---|---|---|---|---|
| Pilot Certificates Held | 733,255 | 699,653 | 682,959 | -6.9 |
| Active General Aviation Aircraft | 209,779 | 202,700 | 184,433 | -12.1 |
| General Aviation Aircraft Shipments | 4,266 | 1,085 | 899 | -78.9 |
| Total Aircraft Landing Facilities | 15,831 | 17,015 | 17,846 | 12.7 |
| Public Use Landing Facilities | 6,127 | 5,723 | 5,545 | -9.5 |
| General Aviation Hours Flown (Millions) | 36.5 | 30.9 | 26.5 | -27.4 |
| General Aviation Total Accidents* | 3,233 | 2,494 | 1,956 | -39.5 |
| General Aviation Fatal Accidents* | 591 | 447 | 408 | -31.0 |
| General Aviation Fatalities* | 1,187 | 838 | 812 | -31.6 |

* 1992 data is preliminary

# *ANNOUNCEMENT*

FEDERAL AVIATION ADMINISTRATION
WASHINGTON, D.C.

## AVIATION EDUCATION PROGRAM

IS PLEASED TO ANNOUNCE

## A NEW RESOURCE FOR EVERY EDUCATOR

IN COOPERATION WITH
THE FEDERAL EDUCATIONAL INFORMATION EXCHANGE

# *FEDIX*

ON-LINE COMPUTER
INFORMATION CLEARINGHOUSE

ACCESS WITH ANY PC & MODEM
DATA LINE: 1-800-783-3349
HELP LINE: (301) 975-0103

## FAA AVIATION EDUCATION MENU

FAA NEWS & LEGAL INFORMATION
AGENCY OVERVIEW
PRE-COLLEGE PROGRAMS
RESEARCH GRANTS & COE
COLLEGE/UNIVERSITY PROGRAMS
FAA RESOURCE CENTERS
REGIONAL AND STATE PROGRAMS
AVIATION INDUSTRY PROGRAMS
ADDITIONAL RESOURCES
PROCUREMENT NOTICES
FAA EMPLOYMENT

THIS IS A FREE ON-LINE COMPUTER SERVICE

## WHAT IS FEDIX?

**FEDIX** is an on-line information retrieval service that links the higher education community and the federal government to facilitate research, education, and public service programs. The system provides accurate and timely federal agency information to colleges, universities, and other research organizations. There are now approximately 4000 FEDIX users, of which 2000 are from the higher education community and 650 from the federal government. In addition, callers from pre-college institutions, libraries, media, hospitals, and industry commonly access FEDIX.

There are no registration fees and no access charges for using FEDIX.

FEDIX provides regular updates on federal education and research programs, new funding for specific research and education activities, available used government research equipment, minority assistance research and education programs, current events within participating agencies, and general information such as agency history, budget, organizational structure, etc.

Ten federal agencies have joined FAA to disseminate information through FEDIX and more are expected to join. Agencies participating in FEDIX now are:

- o Agency for International Development (AID)
- o Air Force Office of Scientific Research (AFOSR)
- o Department of Commerce (DOC)
- o Department of Education (DOEd)
- o Department of Energy (DOE)
- o Department of Housing and Urban Development (HUD)
- o Federal Aviation Administration (FAA)
- o National Aeronautics and Space Administration (NASA)
- o Office of Naval Research (ONR)
- o National Science Foundation (NSF)
- o National Security Agency (NSA)

**USING THE SYSTEM** - Significant benefits for FAA can be realized through FEDIX, including: 1) decreasing the number of routine inquiries to program managers and other staff; 2) reducing the amount of printed materials mailed by the department; 3) increasing the number of high-quality proposals; 4) enhancing FAA staff awareness of similar activities within FAA and at other agencies to promote cooperation within and outside the Department. All program managers should familiarize themselves with FAA and encourage current or potential participants in FAA's research and educational activities to use the system.

Any microcomputer with communications software (or a dumb terminal) and a modem operating at 1200 or 2400 baud can access the system. FEDIX operates 24 hours a day, 7 days a week. To access FEDIX, set your modem parameters to: 8 data bits, 1 stop bit, and "N" for no parity. The data line numbers are 301-258-0953 (local) or 1-800-232-4879. A HELPLINE (301-975-0103) is available M-F 8:30AM-4:30PM EDT.

**MOLIS** - The Minority On-Line Information Service (MOLIS) complements the FEDIX system by providing current information on the capabilities of Black and Hispanic colleges and universities for use by federal agencies. This system is a valuable resource for all FAA staff involved in research and educational activities by providing easy access to minority institution capabilities including: research centers, facilities, equipment and activities, education programs, enrollment, faculty, and administrative personnel data, emerging capabilities, and financial information.

Dial 301-258-5016 (local) or 1-800-62MOLIS to gain free access to MOLIS. Use the same modem settings and HELPLINE number as FEDIX.

# THE FUTURE STARTS TODAY!

**Federal Aviation Administration (FAA)**
**1994 Aviation Career Education (ACE) Academies**

The excitement continues as the FAA proudly presents its fourth season of Aviation Career Education (ACE) Academies in Alaska. ACE Academies are summer camps devoted to introducing young people to the excitement of aviation and the wonderful career opportunities for the 21st century in an atmosphere that is both educational and loads of fun.

Each Academy promises tours, presentations and hands-on activities--all with an aviation theme. Learn how to build a plane, a rocket, a career! The sky's the limit! Students will fly in an airplane and learn from the experts about aviation history, the theory of flight, aerospace design and engineering, commercial/military/general aviation, rocketry, aviation weather, remote-controlled airplanes, and the list goes on and on. Students are eligible to attend any of the ACE Academies regardless of where they live. Dates for the 1994 season have not been determined at this time. If you would like to have your name placed on a mailing list for more information, fill out, clip, and mail the following form to:

Mary Lou Dordan
Federal Aviation Administration
222 W. 7th Ave., #14
Anchorage, AK 99513-7587.

---

(cut here)

I WOULD LIKE INFORMATION CONCERNING THE FOLLOWING FAA PROGRAMS:

_____ACE Academies
_____Aviation Education Teacher Workshop
_____Aviation Career Series Publications

**PLEASE PRINT**:

NAME____________________________________________

STREET ADDRESS__________________________________

CITY______________________STATE__________ZIP CODE________

PHONE NUMBER (Optional)_________________________

# ALASKA DEPARTMENT OF EDUCATION
# EQUITY PUBLICATIONS
## 1994-1995

**Equity Training Modules**

Cost: $4.00 each In-state
$6.00 each Out-of-state

| Subject Areas Teacher Training Materials | Quantity | Total Cost |
|---|---|---|
| Equity in the Fine Arts | | |
| Women in American History (1-6) | | |
| Women in American History (7-12) | | |
| Language Bias | | |
| Equity in Science | | |
| Equity and Physical Education | | |
| Equity in Health Education (1-6) | | |
| Screening for Equity in Curriculum Materials | | |
| Women in Literature (7-12) | | |
| Women in World History | | |
| Demographics: A Rationale For Equity in the 90's | | |
| Gender Equity Video - $15.00<br>"We Can Do Anything" (Duplication permitted for educational use only) | | |
| **Subtotal** | | |

**Equity Curriculum Guides**

Cost: $4.00 each in-state
$6.00 each out-of-state

| Women's History /Equity Curriculum Guides | | |
|---|---|---|
| Women and Minorities in Alaska Aviation 1994 | | |
| Non-Traditional Employment For Men and Women 1993 | | |
| Alaska Women in the Iditarod-1992 | | |
| Northwest Women in Science - 1992 | | |
| Alaska Native Women Pre-Statehood 1991<br>(Companion audio-tape -Maggie Lind $2.00 additional) | | |
| Women in Alaska History-1990<br>(Black Women in Alaska) | | |
| Women in Alaska History-1988<br>(Women in the Fine Arts) | | |
| Women in Alaska History-1988<br>(Women in Sci. and Soc. Studies) | | |
| **Subtotal** | | |

Date:__________ PO#:__________________

Shipped To:__________________________

______________________________________

______________________________________

______________________________________

Subtotal: $__________

+ 10% Shipping & Handling $__________

**Total** $__________

***Sorry, No Refunds.** Costs of producing these publications come directly from sales. For this reason refunds are not possible.

**To order, please contact:**
**Gender Equity Specialist**
**Department of Education**
**801 West 10th Street, Suite 200**
**Juneau, AK 99801-1894**
**Fax: 465-3396 Phone: 465-8717**

w:\equity\pubinvce.doc

# WOMEN MINORITIES IN ALASKAN AVIATION
# FEEDBACK FORM

NOTE: Now that you have completed this unit, please take a moment to complete the following evaluation. Your input will be of importance in any future distribution and/or revisions.

YOUR NAME: (optional) ______________________________

GRADE LEVEL: ______ SCHOOL ______________________ No. OF STUDENTS_____

## I. BIOGRAPHIES

| | | | | | |
|---|---|---|---|---|---|
| | Not Appropriate | | | | Very Appropriate |
| A. Selection of individuals was appropriate. | 1 | 2 | 3 | 4 | 5 |
| | Not Interesting | | | | Very Motivational |
| B. Information was interesting and motivation to students. | 1 | 2 | 3 | 4 | 5 |
| | Did Not Demonstrate the Importance of Choices | | | Strongly Demonstrated the Importance of Choices | |
| C. Stories helped students make personal and career education choices. | 1 | 2 | 3 | 4 | 5 |

COMMENTS: ______________________________

______________________________

______________________________

## II. ACTIVITIES

| | | | | | |
|---|---|---|---|---|---|
| | Not Clear | | | | Very Clear |
| A. Procedures for activities were made clear. | 1 | 2 | 3 | 4 | 5 |
| | Not Appropriate | | | | Very Appropriate |
| B. Activities were appropriate for students for this grade level | 1 | 2 | 3 | 4 | 5 |
| | Boring | | | | Exciting |
| C. Activities were interesting and exciting | 1 | 2 | 3 | 4 | 5 |

D. Which activity did your students enjoy the most? ______________________________

E. Are there activities that need to be eliminated or replaced? If so, please identify the lesson and activity. ______________________________

COMMENTS: ______________________________

______________________________

______________________________

______________________________

OVER ☞

## III. SUPPLEMENTS/ATTACHMENTS

| | | | | | |
|---|---|---|---|---|---|
| | Not Appropriate | | | | Very Appropriate |
| A. Readings/Supplements were appropriate for students of this grade level. | 1 | 2 | 3 | 4 | 5 |
| | Not at All | | | | To a Great Extent |
| B. Readings/Supplements contributed to understanding of subject matter. | 1 | 2 | 3 | 4 | 5 |

COMMENTS: ______________________________________________

______________________________________________

______________________________________________

## IV. GENERAL

A. Which lesson did you like the most? ______________________________________________

______________________________________________

B. Which lesson did you like the least? ______________________________________________

______________________________________________

## V. OVERALL RATING

A. Overall I would rate this curriculum program:

| | | | | |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
| Irrelevant | Poor | Fair | Good | Outstanding |

B. Overall, do you feel that this curriculum guide raised students' awareness of gender bias?

______________________________________________

C. Did the guide help students gain a better understanding of aviation careers? ______________________

______________________________________________

COMMENTS: ______________________________________________

______________________________________________

______________________________________________

______________________________________________

***Please make additional copies for each teacher***